Portfolio of intelligence tests

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NATIONAL INTELLIGENCE TESTS

SCALE B — FORM 1

Prepared under the auspices of the National Research Council by M. E. Haggerty, L. M. Terman, E. L. Thorndike, G. M. Whipple, and R. M. Yerkes

Name ..... Grade ..... Boy or girl .....
First name Last name

Date of birth ..... Age .....
Month Day Year Years Months

Birthplace of parents ..... Race .....
Father Mother

Name of teacher .....

Name of school .....

Name of city .....

Date of examination .....

Test	Rights	Method	Score
1		× 2 =	
2		=	
3		Wrongs −( ) =	
4		=	
5		Wrongs −( ) =	
Total Score (Sum of scores of five tests)			

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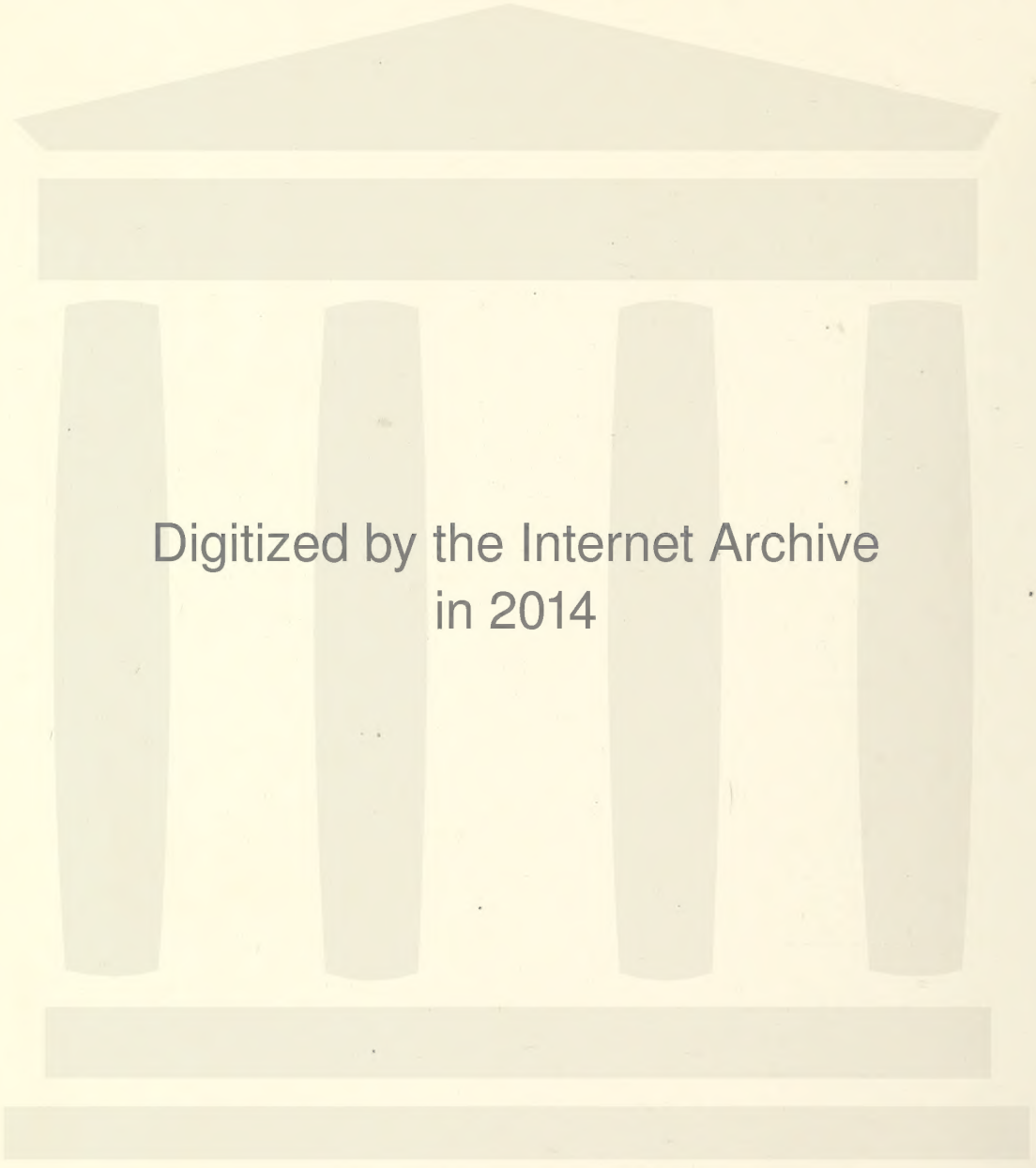

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Exercise 1

Do this work in arithmetic as quickly as you can without making mistakes. Try each example as you come to it. Look carefully at each one to see what you are to do.

Begin here

(1) Add

$$\begin{array}{r} 4 \\ 2 \\ \hline \end{array}$$

(2) Multiply

$4 \times 5 =$

(3) Add

$$\begin{array}{r} 32 \\ 25 \\ 19 \\ \hline \end{array}$$

(4) Subtract

$$\begin{array}{r} 13 \\ 5 \\ \hline \end{array}$$

(5) Divide

$11 \div 3 =$

(6) Multiply

$$\begin{array}{r} 5073 \\ 9 \\ \hline \end{array}$$

(7) Divide

$37\overline{)14282}$

(8) Subtract

$\frac{6}{7} - \frac{4}{5} =$

(9) Divide

$\frac{3}{4} \div 5 =$

(10) Multiply

$$\begin{array}{r} 358\frac{1}{3} \\ 26 \\ \hline \end{array}$$

Test 1

Do this work in arithmetic as quickly as you can without making mistakes. Try each example as you come to it. Look carefully at each one to see what you are to do.

Begin here

(1) Add	(2) Multiply	(3) Subtract	(4) Divide	(5) Add	(6) Multiply
1	$2 \times 3 =$	5	$2\overline{)8}$	19	26
5		2		3	3

(7) Add	(8) Subtract	(9) Divide	(10) Multiply	(11) Subtract	(12) Divide
24	16	$13 \div 4 =$	6084	37344	$380 \div 7 =$
27	7		7	14853	
15					

(13) Add	(14) Divide	(15) Subtract	(16) Add
\$ 80.41	$48\overline{)1536}$	$126.16 - 23.88 =$	$\frac{5}{6} + \frac{3}{12} =$
1.00			
10.20			
.04			
203.00			
3022.02			

(17) Divide	(18) Multiply	(19) Add
$\frac{2}{3} \div 4 =$	$249\frac{3}{4}$	1 hr. 35 min.
	25	47 min.
		2 hr. 10 min.

(20)	(21) Multiply	(22) Subtract
$12\frac{1}{2}\%$ of $160 =$	63 lb. 8 oz.	$8.3 - 3.00072 =$
	6	

Exercise 2

SAMPLES
Sheep eat mostly nuts <u>grass</u> fruits bread
The number of cents in a dime is 2 5 10 25

In each sentence draw a line under the one word that makes the sentence true.

Begin here

1 The number of days in a week is 5 6 7 12 1
2 The kitten is the young of the dog cat lion sheep 2
3 The day before Thursday is Wednesday Tuesday Friday Monday . 3
4 Cheese comes from butter plants eggs milk 4
5 Leather comes from cotton wool skins bark 5

6 An animal that moves very slowly is the snail squirrel rabbit deer 6
7 The elm is a kind of bush flower vine tree 7
8 Soap is made from sugars fats pears lemons 8
9 Easter comes in fall winter spring summer 9
10 Figs grow on a bush stalk tree vine 10

11 America was discovered by Drake Hudson Columbus Raleigh 11
12 Glass is made of sand gravel clay mica 12
13 The highest price per pound is usually paid for flour sugar coffee salt 13
14 Pearls are obtained from mines elephants reefs oysters 14
15 The tadpole is the young of the fish frog lizard crayfish 15

16 Cypress is a kind of machine food fabric tree 16

Test 2

In each sentence draw a line under the one word that makes the sentence true, as shown in the samples.

SAMPLES
Sheep eat mostly nuts grass fruits bread
The number of cents in a dime is 2 5 10 25

Begin here

1 The day before Sunday is Friday Monday Saturday Thursday 1
2 Ripe strawberries are black green blue red 2
3 Raisins are dried cranberries currants gooseberries grapes 3
4 The axle is a part of a bed ax chair wagon 4
5 Most spiders spin webs to catch birds fish flies snakes 5

6 A net is used in playing croquet football golf tennis 6
7 The buffalo looks most like a cow deer sheep wolf 7
8 New Year's Day is April 1 December 1 January 1 July 1 8
9 " Hiawatha " was written by Cooper Longfellow Poe Whittier 9
10 A country that fought on Germany's side was Greece Holland Roumania Turkey 10

11 Diamonds are obtained from mines oysters reefs whales 11
12 An animal with a painful sting is the cricket hornet locust salamander 12
13 The month before October is August December November September 13
14 A guitar is played with bow fingers mouth sticks 14
15 The highest price per bushel is usually paid for corn oats turnips wheat ... 15

16 The incubator is useful in raising cattle chickens corn cotton 16
17 Boston is in Connecticut Maine Massachusetts Rhode Island 17
18 A state famous for oranges is Alabama California Louisiana Texas 18
19 The number of weeks in a month is about 2 4 6 8 19
20 Cambric is a cloth color dance food 20

21 A duet is sung by one two four six 21
22 The Arabian is a kind of cow goat horse sheep 22
23 Sirloin is a cut of beef mutton pork veal 23
24 Massachusetts was settled by the Huguenots Moors Pilgrims Quakers ... 24
25 A canteen is a kind of cannon cup flask musket 25

26 Of parsnips we eat the flower leaf root stem 26
27 Turquoise is usually blue green red yellow 27
28 A peck is a fourth of a barrel bushel gallon keg 28
29 Turpentine comes from hides ore petroleum trees 29
30 A man known for his strength was Abel David Samson Solomon 30

31 A lake that touches Ohio is Erie Huron Ontario Superior 31
32 James A. Garfield was a poet inventor president writer 32
33 The loom is used for carding sewing spinning weaving 33
34 Among Robin Hood's men was Allan Breck Natty Bumpo Galahad Friar Tuck 34
35 General Lee surrendered at Appomattox in 1812 1886 1865 1832 35

36 One of the first locomotives was made by Fulton Morse Stephenson Whitney 36
37 The aorta is a blood vessel bone muscle nerve 37
38 " The Secret Garden " tells about Colin Joan of Arc Rebecca William Tell 38
39 The humerus is a bone gland muscle nerve 39
40 A meter is nearest in length to the inch foot yard rod 40

Exercise 3

SAMPLES
Can cows eat? ..... Yes No
Do stones swim? ..... Yes No

Read each question and draw a line under the right answer.

Begin here	1	Do flowers bloom?	Yes	No
	2	Are apples good to eat?	Yes	No
	3	Are some houses built of stone?	Yes	No
	4	Is the sky ever gray?	Yes	No
	5	Has our flag green stars?	Yes	No
	6	Do trees ever grow on moist land?	Yes	No
	7	Are newspapers printed in churches?	Yes	No
	8	Is stealing a proper pastime?	Yes	No
	9	Are steeples commonly found in barrels?	Yes	No
	10	Is furniture usually visible?	Yes	No
	11	Is a memorable publication often trivial?	Yes	No
	12	Is a dromedary a curious implement?	Yes	No
	13	May a reprimand cause poignant distress?	Yes	No
	14	Are veracious statements frequently inconsistent?	Yes	No
	15	Can acrimonious criticism be censorious?	Yes	No

Test 3

Draw a line under the right answer to each question. Do as many as you can.

SAMPLES
Can cows eat? ..... Yes No
Do stones swim? ..... Yes No

Begin here
1 Have you a name? ..... Yes No
2 Do apples have seeds? ..... Yes No
3 Are all birds blue? ..... Yes No
4 Are books useful? ..... Yes No
5 Is it always morning? ..... Yes No

6 Do bears have legs? ..... Yes No
7 Do daisies bloom in meadows? ..... Yes No
8 Does ice make water warmer? ..... Yes No
9 Does a dollar have eyes? ..... Yes No
10 Is red a color? ..... Yes No

11 Are shawls made of brass? ..... Yes No
12 Do children like pain? ..... Yes No
13 Are handkerchiefs ever found useful? ..... Yes No
14 Are avenues found in large cities? ..... Yes No
15 Is a fish ever covered with scales? ..... Yes No

16 Do some kitchens have cupboards? ..... Yes No
17 Can you carry water in a sieve? ..... Yes No
18 Do "herring" and "hereditary" mean the same? Yes No
19 Do ducks like corn? ..... Yes No
20 Are accurate reports ever worth while? ..... Yes No

21 Is medicine ever purchased by a physician? ..... Yes No
22 Should a sentinel be trustworthy? ..... Yes No
23 Do we desire serious trouble? ..... Yes No
24 Do builders construct bridges? ..... Yes No
25 Does money necessarily bring happiness? ..... Yes No

26 Would you trust people who have malicious designs? .... Yes No
27 Is it an outrage to insult a well-behaved tourist? ..... Yes No
28 Are chandeliers found inside stately mansions? ..... Yes No
29 Is a traitor one who never betrays confidence? ..... Yes No
30 Can all teachers ascertain with correctness the chemical properties of food? ..... Yes No

31 Are measurements used in astronomy? ..... Yes No
32 Does a conscientious commander mourn the loss of his men? .. Yes No
33 Are "synthesis" and "analysis" synonyms? ..... Yes No
34 Do disastrous consequences sometimes succeed defiance of authority? ..... Yes No
35 Does manual labor always terminate in cerebral hemorrhages? Yes No

36 Is alliteration a form of pentameter? ..... Yes No
37 Is a penurious man averse to a policy of hoarding money? ..... Yes No
38 Do those evincing modesty and virtue behave in an indecorous manner? ..... Yes No
39 Is the cessation of belligerency ever desirable? ..... Yes No
40 Is a natatorium a place for swimming? ..... Yes No

Exercise 4

Samples	shoe — foot	———	hat — coat nose see head
	sky — blue	———	grass — grows summer green tall
	bird — sing	———	dog — tail bark walk kennel
	bird — fly	———	dog — tail bark walk kennel
	dress — cloth	———	hat — head wear band straw

Read carefully the first three words in each line. Then read the last four and draw a line under the right one.

Begin here

1	baby — cries	———	cat — mews hole little dog	1
2	dog — hair	———	fish — cat water scales pole	2
3	chew — teeth	———	smell — sweet strong odor nose	3
4	book — paper	———	dress — worn cloth fruit tree	4
5	sailor — ship	———	preacher — pray church preach read..	5
6	go — come	———	sell — leave papers money buy	6
7	ball — hand	———	football — play game field foot	7
8	paddle — canoe	———	sail — ocean boat wind steam	8
9	city — houses	———	forest — trees dark country birds	9
10	hat — brim	———	house — high sun porch chair	10
11	reward — hero	———	punish — God whip pain traitor.....	11
12	100 — 90	———	10 — 6 7 8 9.....	12

Test 4

Read carefully the first three words in each line. Then read the last four and draw a line under the right one.

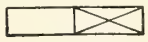
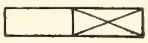
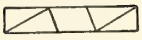
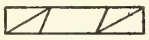
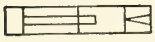
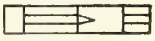
SAMPLES	shoe — foot	———	hat — coat nose see head
	sky — blue	———	grass — grows summer green tall
	bird — sing	———	dog — tail bark walk kennel
	bird — fly	———	dog — tail bark walk kennel
	dress — cloth	———	hat — head wear band straw

Begin here

1	finger — hand	———	toe — box foot doll coat	1
2	cannon — shoots	———	bell — rings door metal maid	2
3	sweet — sugar	———	sour — sweet cake vinegar man	3
4	handle — hammer	———	knob — key room shut door	4
5	suitcase — clothing	———	purse — purchase money string stolen	5
6	Wednesday — day	———	July — August hot month year	6
7	clothes — man	———	fur — dress warm soft animal	7
8	razor — beard	———	saw — cloth tool wood sharp	8
9	feather — float	———	rock — ages hill sink break	9
10	packing — pack	———	lifting — lifter lift lifted lifts	10
11	pan — tin	———	table — chair wood legs dishes	11
12	strength — boldness	———	weakness — woman run cry timidity	12
13	fish — salmon	———	bird — robin sing nest bushes	13
14	violin — bow	———	drum — loud parade stick march	14
15	man — Adam	———	woman — girl Eve dress female	15
16	12 — 36	———	8 — 24 88 16 48	16
17	above — below	———	top — spin bottom surface side	17
18	second — minute	———	minute — time week day hour	18
19	June — May	———	August — July March October November	19
20	establish — begin	———	abolish — end slavery wrong abolition	20
21	food — costly	———	air — breathe gas free oxygen	21
22	success — joy	———	failure — sadness luck fail work	22
23	quarrel — enemy	———	agree — friend disagree agreeable foe	23
24	hinge — door	———	joint — bone fasten stiff open	24
25	devil — angel	———	bad — mean disobedient defamed good	25
26	dead — lifeless	———	danger — peril accident wreck run	26
27	floor — ceiling	———	ground — earth sky dirt grass	27
28	water — fish	———	air — nose man blame breathe	28
29	snake — adder	———	dog — black bark cat spaniel	29
30	person — crowd	———	one — all many few large	30
31	$\frac{5}{2}$ — 10	———	1 — 2 4 6 8	31
32	almost — entirely	———	rarely — ever often never seldom	32

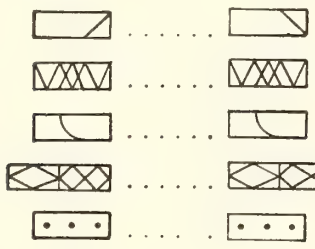
Exercise 5

If the two things in a pair are the same, write **S** on the dotted line between them. If they are different, write **D** on the dotted line between them. Do each one as you come to it.

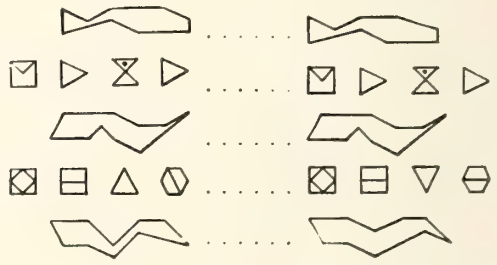
Begin here	273	273
	3861	3854
	Roland R. C.	Rollan R. C.
		
	2579	2397
	38657	38657
	926745	926145
	Rapen J. D.	Rapon J. O.
	Palteser F.	Palteser F.
		
	.....	
		
	468225	468235
	920379	923079
	5218861	5218861
	3238734	3328734
	21059876	21059876
	Singleton O. J.	Singleton O. J.
	Siegel P. D.	Seigel P. D.
	Richards W. E.	Richards W. E.

Test 5

If the two things in a pair are the same, write S. If they are different, write D. Do each one as you come to it.

Begin here 561	560
493	493
5172	5172
9432	9342
19037	19037
Capline J. F.	Caplein J. F.
Carlson B. O.	Carlson B. O.
Abbott J. V.	Abbett J. V.
Barnum O. L.	Barman O. L.
Beakes E. W.	Beakes E. W.
	
70090	71090
276431	267431
5307251	5307257
23544636	23445636
57216472	57216472
Basler A. H.	Basler A. H.
Aspinwall G.	Aspinwald G.
Armand J. P.	Armand J. P.
Castleman F.	Castleman F.
Barsk C. P.	Barks C. P.

☞ Go to the other column at the top of the page and do as many as you can.

40246586	40246586
875012534	975012534
388132902	388123902
742138694	742138694
8566607362	8656607362
3371089340	3371089344
2986751243	2986751243
7649266315	7649366215
5144667210	5144667210
4046169289	4046169289
	
Anderson L. B.	Andersen L. B.
Johnson G. W.	Johston G. W.
Reynolds F. J.	Reynolds F. J.
Saunders D. E.	Saunders D. E.
Whittaker S. P.	Whithaker S. P.
280587204	380587204
479124079	479124079
7949623615	7949623615
3652881365	3562881365
9655834821	9655834821

NATIONAL INTELLIGENCE TESTS

SCALE A — FORM 1

Prepared under the auspices of the National Research Council by M. E. Haggerty, L. M. Terman, E. L. Thorndike, G. M. Whipple, and R. M. Yerkes

Name ..... *Grade* ..... *Boy or girl* .....
First name Last name

Date of birth ..... *Age* .....
Month Day Year Years Months

Birthplace of parents ..... *Race* .....
Father Mother

Name of teacher .....

Name of school .....

Name of city .....

Date of examination .....

Test	*Rights*	*Method*	*Score*
1		× 2 =	
2		× 2 =	
3		=	
4		*Wrongs* − ( ) =	
5		× 3/10 =	
Total Score (Sum of scores of five tests)			

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Exercise 1

Find all the answers as quickly as you can.
Write the answers on the dotted lines.
Use the sides or bottom of the page to figure on.

Begin here

1 How many cents are six cents and five cents? *Answer*.....

2 A girl earned 75 cents and spent 43 cents. How much did she have left? *Answer*.....

3 How many nickels make a dollar? *Answer*.....

4 How many square inches are there in a card 7 inches long by 6 inches wide? *Answer*.....

5 How long will it take a man to walk 19 miles at the rate of 4 miles an hour while walking if he makes two stops of an average length of 15 minutes each? *Answer*.....

6 On December 20 the sun rises at 7:22 and sets at 4:48. How much less of the day is daylight than dark? *Answer*.....

Test 1

Find all the answers as quickly as you can.
Write the answers on the dotted lines.
Use the sides or bottom of the page to figure on.

Begin here

1 Five cents make 1 nickel. How many nickels make a dime? *Answer* .....

2 John paid 5 dollars for a watch and 3 dollars for a chain. How many dollars did he pay for the watch and chain? *Answer* .....

3 Nell is 13 years old. Mary is 9 years old. How much younger is Mary than Nell? *Answer* .....

4 One quart of ice cream is enough for 5 persons. How many quarts of ice cream are needed for 25 persons? *Answer* .....

5 John's grandmother is 86 years old. If she lives, in how many years will she be 100 years old? *Answer* .....

6 If a man gets $2.50 a day, what will he be paid for six days' work? *Answer* .....

7 How many inches are there in a foot and a half? *Answer* .....

8 What is the cost of 12 cakes at 6 for 5 cents? *Answer* .....

9 The uniforms for a baseball team of nine boys cost $2.50 each. The shoes cost $2 a pair. What was the total cost of uniforms and shoes for the nine? *Answer* .....

10 A train that usually arrives at half-past ten was 17 minutes late. When did it arrive? *Answer* .....

11 At 10¢ a yard, what is the cost of a piece of ribbon $10\frac{1}{2}$ ft. long? *Answer* .....

12 A man earns $6 a day half the time, $4.50 a day one fourth of the time, and nothing on the remaining days for a total period of 40 days. What did he earn in all in the 40 days? *Answer* .....

13 What per cent of $800 is 4% of $1000? *Answer* .....

14 If 60 men need 1500 lb. flour per month, what is needed per man per day, counting a month as 30 days? *Answer* .....

15 A car goes at the rate of a mile a minute. A truck goes 20 miles an hour. How many times as far will the car go as the truck in 10 seconds? *Answer* .....

16 The area of the base (inside measure) of a cylindrical tank is 90 square feet. How tall must it be to hold 100 cubic yards? *Answer* .....

Exercise 2

SAMPLES
Sugar.....sweet.
.....sing.

Write on each dotted line one word to make the sentence sound sensible and right.

Begin here

1 The apple is .....

2 Fish swim ..... the water.

3 Boys ..... girls like to ..... ball.

4 Fire is hot, but ice is .....

5 The child will ..... his hand if ..... plays with that knife.

6 The ..... sets ..... night and ..... in the morning.

7 We ..... if we would.

8 Time ..... sometimes worth more ..... money.

9 Hard work ..... men .....

10 History is an ..... of ..... that took place in the .....

Test 2

Write on each dotted line one word to make the sentence sound sensible and right.

SAMPLES { Sugar . . . . *is* . . . . sweet.
. . . . *Birds* . . . . sing.

Begin here

1 The dog . . . . . black.

2 An airplane is able to . . . . . a great distance in a short time.

3 Mother is . . . . . doughnuts.

4 There are seven . . . . . in the rainbow.

5 Rain . . . . . snow fall from the clouds.

6 We love liberty . . . . . the United States.

7 Twenty-five cents make one . . . . . of a dollar.

8 Bananas grow in . . . . . climates.

9 He tried to . . . . . his ball among the bushes.

10 Jack came to . . . . . me mow the lawn.

11 Trees are . . . . . than bushes.

12 Winter is . . . . . in the North and short in the . . . . . .

13 The man . . . . . aids his fellows will . . . . . his reward.

14 A . . . . . is made up . . . . . an engine and coaches.

15 You should never go . . . . . a crowd when . . . . . have a cold.

16 Several . . . . . have gone by since the end of the greatest . . . . . in history.

17 Labor unions . . . . . the right to . . . . . for higher wages.

18 The visitor . . . . . the child . . . . . name.

19 Poverty cannot . . . . . down a man . . . . . is intelligent and . . . . . hard.

20 . . . . . should prevail in churches and libraries.

Exercise 3

SAMPLES

man	(body cane head shoes teeth)
dog	(blanket chain collar legs nose)
house	(cellar paint room servants walls)

In each row draw a line under each of the two words that tell what the thing always has.

Begin here	1	**table**	(books cloth dishes legs top)
	2	**apple**	(basket redness seeds skin sweetness)
	3	**shoe**	(button foot sole toe tongue)
	4	**showers**	(clouds lightning rain thunder wind)
	5	**scissors**	(cloth cutting edge metal paper)
	6	**travel**	(automobile journey moving train visit)
	7	**teeth**	(dentist enamel pain pulp toothbrush)
	8	**idiocy**	(crime foolishness poverty stupidity tuberculosis)

Test 3

In each row draw a line under each of the two words that tell what the thing always has.

SAMPLES

man	(body	cane head shoes teeth)
dog	(blanket	chain collar legs nose)
house	(cellar	paint room servants walls)

Begin here

1	elephant	(circus ears hay keeper trunk)
2	mouse	(back cat eyes cheese trap)
3	hoe	(blade digging garden handle rust)
4	iron	(coldness polish rust strength weight)
5	barn	(hayloft horses roof sheep walls)
6	stream	(banks fish fisherman mud water)
7	penny	(brightness copper date dirt Indian)
8	bureau	(brush drawers mirror scarf top)
9	city	(automobiles buildings crowds streets street cars)
10	cube	(corners drawing size stone wood)
11	ring	(diameter diamond monogram roundness seal)
12	diphtheria	(convalescence eruption fever germs medicine)
13	lake	(fish salt sand shore water)
14	division	(classroom dividend divisor paper pencil)
15	gasoline	(automobile can explosion liquid odor)
16	gladness	(cheerfulness excitement joy laughter smiling)
17	crowd	(closeness danger dust excitement number)
18	parade	(automobiles flags horses people route)
19	reading	(book eyes picture printing words)
20	cough	(ache danger irritation noise sneezing)
21	love	(affection attachment display kisses sweetheart)
22	jungle	(tigers hunters path thickets vegetation)
23	king	(crown kingdom prince scepter subjects)
24	fiction	(falsehood hero imagination impossibility invention)

Exercise 4

SAMPLES
- cold . . **D** . . hot
- big . . . . . large
- best . . . . . worst

If the two words mean the same, write **S** on the dotted line between them.
If they are as different as can be, write **D** between them.

Begin here

1 yes . . . . . no
2 son . . . . . daughter
3 light . . . . . bright
4 crawl . . . . . creep
5 wet . . . . . dry

6 lift . . . . . raise
7 tall . . . . . short
8 die . . . . . live
9 nay . . . . . no
10 rough . . . . . smooth

11 hill . . . . . valley
12 genuine . . . . . real
13 useless . . . . . useful
14 center . . . . . rim
15 brief . . . . . short

16 tease . . . . . plague
17 liquid . . . . . solid
18 crafty . . . . . tricky
19 elevate . . . . . raise
20 astonish . . . . . surprise

Test 4

If they mean the same, write S between them.
If they are as different as can be, write D between them.

SAMPLES
cold..D..hot
big..S..large
best..D..worst

Begin here

1 new.....old
2 still.....noisy
3 fall.....drop
4 up.....down
5 wrong.....right

6 liberty.....freedom
7 raise.....lower
8 sharp.....dull
9 hit.....strike
10 alike.....different

11 calm.....stormy
12 take.....give
13 broad.....wide
14 distant.....near
15 ascend.....descend

16 awkward.....clumsy
17 masculine.....feminine
18 courage.....bravery
19 rough.....uneven
20 build.....construct

21 continue.....cease
22 go.....leave
23 coarse.....crude
24 bondage.....slavery
25 either.....neither

26 refuse.....decline
27 abrupt.....sudden
28 kindle.....quench
29 delve.....dig
30 extreme.....moderate

31 admire.....esteem
32 legend.....myth
33 agreement.....harmony
34 frank.....candid
35 transient.....permanent

36 expect.....anticipate
37 coy.....bold
38 eminent.....obscure
39 censure.....approve
40 bliss.....ecstasy

☞ Go to the other column at the top of the page and do as many as you can.

Exercise 5

Make under each drawing the number you find under that drawing in the key. Do each one as you come to it.

KEY

△	□	∞	+	Σ	⊕	⊕	⊟	◇
1	2	3	4	5	6	7	8	9

Begin here

∞	△	+	⊕	□	⊕	+	△	Σ	◇	□	∞	⊕	⊟	+	◇	⊕	∞	⊟	□
3	1	4																	

⊕	△	⊟	Σ	⊕	□	◇	∞	⊕	+	◇	∞	△	□	Σ	⊟	Σ	△	+	⊕

Test 5

Make under each drawing the number you find under that drawing in the key. Do each one as you come to it.

KEY

1	2	3	4	5	6	7	8	9

Begin here

NATIONAL INTELLIGENCE TESTS

KEY FOR SCALE A—FORM 1

First Sheet

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Directions for Scoring

General Rules

1. Each item marked by a pupil is scored either right or wrong, and no part credits are given, except in Test 3, Scale A.
2. When an item evidently has been corrected by the pupil, the correction is the answer which should be scored.
3. In tests for which the score is based on the number right, the wrong and omitted items need not be differently checked in scoring. In tests for which the score is *rights* minus *wrongs*, the wrong and omitted items must be differently checked.
4. No minus score is given for any test. If the number to be subtracted (number wrong) is greater than the number right, the score for the test is zero.
5. The scorer should indicate the last item attempted, by drawing a long line under that item and out into the margin.
6. The number of right answers to each test (and number of wrong answers, when required) should be entered in the lower right-hand corner of the test page and encircled. When the scoring has been checked, a check mark may be made beside the circle.
7. The number of right answers to each test, as entered in the right-hand corner of the test (and the number of wrong answers, when required), should be copied into the spaces provided on the first page of the test booklet and the indicated operations performed on that page; as, for example, multiplying the number right by 2, etc., to get the score for each test.
8. The five scores thus obtained should then be added to find the total score.

Test 1 Arithmetical Reasoning

1. Score is number right times 2.
2. Answer may be written on dotted line or elsewhere near its problem.
3. If two different answers are given to any problem, count as wrong.
4. If it seems clear that, by a slip, one answer has been put on the wrong line, and the next answers are all thus misplaced, give credit for the answers that are right even if misplaced.
5. Omission of the dollar sign and other designations is permissible.
6. Omission of decimal point is permissible if the dollar sign is omitted in Form 1, Items 6, 9, and 12; Form 3, Item 6; Form 4, Item 7.

Test 2 Sentence Completion

1. Score is number of correct sentences times 2.
2. Acceptable answers are listed in the key. Apparently there is always the possibility of the appearance of new correct responses. If the completed sentence is clearly correct, it may be given credit even though the answers do not appear in the key; but if the slightest doubt exists, it should be marked wrong.
3. Answers not grammatically correct are wrong. Misspelled answers receive credit if otherwise correct.
4. Sentences, however sensible they may be, are not correct unless one word, and only one word, is written in each space.

Test 3 Logical Selection

1. If one or two words in each item are marked, the score for the item is number of right words. If three or more words are marked, the score for that item is zero. Score on test is sum of scores on items (2 for each perfect item).
2. Any clear method of indicating answer is acceptable.

Test 4 Same — Opposite

1. Score is number right minus number wrong (or 40 minus number of items not marked, minus twice number wrong).
2. If all items are marked *S*, or if all are marked *D*, throughout the test, or toward the end of it, score for the test, or for that part of it, is zero.

Test 5 Symbol — Digit

1. Score is three tenths (0.3) of the number of correct digits.

Test 1

1	2
2	$8
3	4 yr.
4	5 qt.
5	14 yr.
6	$15
7	18 in.
8	10¢
9	$40.50
10	10:47 or 13 min. of 11
11	35¢
12	$165
13	5%
14	⅝ lb.
15	3
16	30 ft.

Test 4

Column 1

1	D
2	D
3	S
4	D
5	D
6	S
7	D
8	D
9	S
10	D
11	D
12	D
13	S
14	D
15	D
16	S
17	D
18	S
19	S
20	S

Column 2

21	D
22	S
23	S
24	S
25	D
26	S
27	S
28	D
29	S
30	D
31	S
32	S
33	S
34	S
35	D
36	S
37	D
38	D
39	D
40	S

Test 4

Test 2

1 is, was

2 ascend, circle, come, cover, cross, do, drive, fall, fly, get, go, make, ride, rise, run, sail, travel

3 baking, buying, cooking, cutting, eating, frying, kneading, making, mixing, selling

4 bands, colors, hues, streaks, stripes, strips (no credit: lines)

5 and (no credit: or)

6 and, for, in, said, throughout (no credit: of)

7 fourth, quarter, 4th, $\frac{1}{4}$ (no credit: 4, half, part, $\frac{1}{3}$)

8 hot, mild, moderate, southern, summer, sunny, temperate, torrid, tropical, warm (no credit: dry)

9 bat, chuck, conceal, discover, find, get, hide, hit, kick, knock, reach, roll, see, throw, toss (no credit: catch, lose)

10 help, make, see, watch (no credit: let)

11 better, bigger, higher, larger, prettier, stronger, taller (no credit: broader, thicker)

12 long, longer (no credit: cold) ..... South, Southeast, Southwest

13 that, who..... earn, find, gain, get, have, reap, receive, want, win

14 (*a*) flier, train..... by, from, of, with
(*b*) story..... about

15 amidst, among, amongst, in, into, join, near, through, to, with..... people, some, they, you

16 centuries, months, winters, years ..... event, life, people, revolution, victory, war (no credit: man, etc.)

17 (*a*) claim, demand, got, have, secured, want.. ask, fight, speak, strike, talk, vote, wish, work
(*b*) made..... strike

18 (*a*) asked (s), gave, told..... her, his, its
(*b*) called (s), knew, knows ..... by
(*c*) called, gave ..... a

19 altogether, always, beat, bring, completely, easily, entirely, ever, hold, keep, knock, pull, put, quickly, soon, take, throw ..... that, who..... thinks, tries, trying, working, works

20 order, quiet, quietness, quietude, silence, stillness (no credit: books)

Test 3

1 ears trunk
2 back eyes
3 blade handle
4 strength weight
5 roof walls
6 banks water
7 copper date
8 drawers top
9 buildings streets
10 corners size
11 diameter roundness
12 fever germs
13 shore water
14 dividend divisor
15 liquid odor
16 cheerfulness joy
17 closeness number
18 people route
19 eyes words
20 irritation noise
21 affection attachment
22 thickets vegetation
23 kingdom subjects
24 imagination invention

NATIONAL INTELLIGENCE TESTS

MANUAL OF DIRECTIONS FOR SCALE A

Prepared under the auspices of the National Research Council by M. E. Haggerty, L. M. Terman, E. L. Thorndike, G. M. Whipple, and R. M. Yerkes

CONTENTS

		PAGE
I.	PREFACE	1
II.	GENERAL DIRECTIONS TO THE EXAMINER	1
III.	DIRECTIONS FOR ADMINISTERING 1. Preparations for Examination — 2. Detailed Instructions	2
IV.	DIRECTIONS FOR SCORING 1. General Rules for Scoring — 2. Detailed Directions	4
V.	NORMS 1. Age Norms — 2. Mental Age Equivalents — 3. Adjustment of Grade Norms — 4. Grade Norms — 5. Age Percentiles — 6. Letter Ratings	5
VI.	TREATMENT AND USES OF INTELLIGENCE TEST SCORES	8

I. PREFACE

In March, 1919, the General Education Board granted to the National Research Council the sum of $25,000 to be used for the preparation of methods of measuring the intelligence of school children. A committee for the conduct of this work was organized by the Research Council, consisting of Drs. M. E. Haggerty, L. M. Terman, E. L. Thorndike, G. M. Whipple, and R. M. Yerkes, *Chairman*. The committee proceeded to define its task and consider the merits of available tests. It was decided to prepare group methods of examining children in Grades 3 to 8. From among the large number of tests considered, twenty-one were selected for preliminary trial, and given to children in Washington, D. C., New York City, Cleveland, Richmond, and Alexandria and other towns in Virginia. The committee chose ten tests for further use on the basis of a statistical analysis made by Dr. T. L. Kelley and of other data concerning the tests.

The tests were arranged in two groups of five each, designated Scale A and Scale B. The five tests in Scale A are Arithmetical Reasoning, Sentence Completion, Logical Selection, Same–Opposite, and Symbol–Digit. The five tests in Scale B are Computation, Information, Vocabulary, Analogies, and Comparison. Materials were prepared for five alternative forms of each test. The forms of the tests were equalized and methods of scoring determined.

Each scale takes approximately thirty minutes to administer. Either Scale A or Scale B may be used alone to serve as a convenient method for the rapid survey of a school system; but the committee recommends that both scales be given, preferably on different days. The second rating may be used as a check on the first, and serious discrepancy will suggest to the teacher the desirability of individual examination.

The scales having been assembled and printed, the committee was enabled to secure tentative norms to be used as standards for comparison of scores, through the generous coöperation of Drs. J. Freeman Guy, J. L. Stenquist, and Helen T. Woolley. Miss Margaret V. Cobb organized and directed the examinations which were made in Washington for the purpose of equalizing the different forms of the scales, and in numerous other ways facilitated the preparation of the tests and increased their serviceability.

The National Intelligence Tests are planned for use in Grades 3 to 8, and with pupils entering high school. The tests may be successfully given and scored by the teacher or supervisor who is sufficiently interested to secure for himself the necessary brief instruction and training in their use.

The following are the necessary materials:

1. The *Manual of Directions*, which contains full directions for the conduct of examinations and age and grade standards.

2. *Examination booklet* for each child to be examined. Both scale and form number must be designated in ordering — as, for example, "Scale A, Form 2" or "Scale B, Form 1."

3. *Keys* for scoring examination papers. These differ for the two scales, A and B, and also for each form of each scale. With each package of twenty-five examination booklets of either scale, any form, a key for scoring that particular form is included.

4. A *Class Record* is enclosed in each package of examination booklets.

II. GENERAL DIRECTIONS TO THE EXAMINER

Any intelligent teacher who can control his class should be able, after brief instruction and practice, to administer the National Intelligence Tests in a reasonably satisfactory manner, and to obtain reliable results. The following important considerations should be kept clearly in mind:

1. The examiner should speak distinctly, at moderate speed and loudly enough to enable all pupils in the room to hear without difficulty.

2. Directions, and especially commands, should be

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spoken authoritatively, and instant obedience should be expected and required. Every child should obey promptly and without question.

3. The instructions for giving the tests should be followed with literal exactness. No additional explanations should be given. A child who does not obey commands should be called to order promptly; if possible, this should be done during an *exercise*[1] rather than during a *test*. Strictness during the first exercise will obviate the necessity for discipline later. With a class which is inclined to be dilatory, a few moments' drill at the start on raising and lowering pencils promptly on command will improve the class spirit.

4. The examiner should be watchful and should attempt to prevent any occurrence within or without the room which would be likely to interfere with the work of either the individual or the group.

5. The room should be quiet; no disturbances should be permitted; preferably there should be no visitors. If there is noise in the hall, the classroom door should be kept closed.

6. *Accurate timing of the tests is of the greatest importance.* For this a stop watch is essential, or, if that is not available, a watch with a second hand and an assistant to act as timer. Otherwise errors in the number of minutes that have elapsed during some of the tests are almost certain to occur.

7. Copying should be prevented, and no child should be permitted to touch pencil to paper except between the commands " Go " and " Stop."

8. Care should be taken to make sure that the proper booklet is supplied to each child and that each booklet is perfect, with pages cut. The examiner may find it helpful to keep before him a personal copy of the form in use and to mark on his copy such information as the duration of each exercise and test.

9. *Children should use pencils, not pens,* for the examination. Each child should be supplied at the start with two rather soft, well-sharpened pencils and an eraser.

III. DIRECTIONS FOR ADMINISTERING

1. Preparations for Examination

Throughout the examination *commands* should be given in a quick, energetic voice, and instant obedience should be required. The *directions*, however, should be given slowly and with careful attention to emphasis.

Have desks cleared. Have extra pencils at hand. Then, if no previous examination has been given, say:

" This is a test to find out what things boys and girls can do. You must do your very best, because we want to see whether the children of the . . . . . School (examiner names the school) **can do as well as others. I think you will find the tests very interesting** (or, in lower grades, say **" great fun "**).

[1] Each test is preceded in the examination booklet by a practice exercise which is intended to show the pupil what is required.

[If previous examination has been given, say instead, holding up test booklets, **" Here are some more tests like those you had before "** or **" yesterday "** or **" last week,"** etc.]

" I am going to give each of you one of these books. Leave it on your desk until I tell you what to do. (Examiner has booklets distributed, taking care to see that they are not opened.)

" First write your name at the top of the page after the word ' Name.' Write your first name and your last name. (Pause.) **After the word ' Grade,' write the number that tells what grade you are in.** (Examiner names the grade.) (Pause.) **After 'Boy or girl,' write the word that tells which you are. If you are a girl, write ' Girl.' If you are a boy, write 'Boy.'** (Pause.) **On the next line, after 'Date of birth,' write the month and the day of the month when you were born. Then, at the end of the line, where it says ' Age,' tell how old you are now. Write the years first and then the months.** (Pause.) **On the next line, over the word ' Father,' write the name of the country where your father was born; over the word ' Mother,' write the name of the country where your mother was born. After the word ' Race,' write ' White '** (or ' Negro,' etc.). **After ' Name of teacher,' write your teacher's name** (examiner mentions the name). (Pause.) **On the next line, after the word ' School,' write . . . . . .** (examiner names the school), **and then the name of this city** (examiner names the city). (Pause.) **On the last line write the date** (examiner gives the date). **When you have written the date, raise your pencil so that I can see that you have finished.**

" Now do just what I tell you to do. Never turn any page unless I tell you to. Never begin until I say ' Go '; that will be the signal. The VERY SECOND I say ' Stop,' you must stop and hold your pencils up (examiner illustrates). **I shall watch to see how quickly you can do it. You may put your elbow on the desk if you like. After we have begun, you must not ask questions.**

" Now turn to Exercise 1 on page 3. Be sure to turn just one leaf. It says ' Exercise 1 ' at the top of the page."

2. Detailed Instructions

1. Arithmetical Reasoning

(After page has been turned.) **" Pencils up!** (Slowly.) **When I say ' Go,' *find all the answers as quickly as you can. Write the answers on the dotted lines.* Use the sides or bottom of the page to figure on. Don't stop to erase your figuring. Pencils up! Ready — Go! "**

After 1 minute say, **" Stop! Pencils up!** (Examiner sees that all stop instantly and hold their pencils up.) **I did not let you finish, because that was just to show you what to do. Next there will be some more of the same kind. When I say ' Over,' you are to turn the page to Test 1 — just *one* leaf — and, when I say ' Go,' do as many as you can. Over! Look at the top of the page to see that it says ' Test 1.' Pencils up! Ready — Go! "**

After 5 minutes say, "Stop! Pencils up!" (Examiner sees that this is promptly obeyed.) Then say slowly, "Look at Exercise 2 on the next page."

2. Sentence Completion

"Look at the first sample at the top of the page: 'Sugar blank sweet.' What word would make the sentence right? (Pause for correct answer.) Yes. That would be *one* good answer. Every one write the word 'is' on the dotted line. Pencils up!

"Look at the next sentence: 'Blank sing.' What word is left out? Yes; every one write 'Birds' (or 'Children,' 'We,' etc.) on the dotted line. (Pause.) Pencils up!

"When I say 'Go,' do the others on this page yourself. Remember, *write on each dotted line just one word to make the sentence sound sensible and right.* Pencils up! Ready — Go!"

After ½ minute say, "Stop! Pencils up! Next there will be some more of the same kind. When I say 'Over,' you are to turn the page to Test 2 — just *one* leaf — and, when I say 'Go,' do as many as you can. Over! Look at the top of the page to see that it says 'Test 2.' Pencils up! Ready — Go!"

After 4 minutes say, "Stop! Pencils up!" (Pause.) Then say slowly, "Look at Exercise 3 on the next page."

3. Logical Selection

"Look at the first sample at the top of the page: 'man (body cane head shoes teeth).' The five words tell what things a man *may* have. Two of them tell what things a man *always* has. A man does not always have a cane. He does not always have shoes. He does not always have teeth. But he does always have a body and a head; so the word 'body' has a line under it and the word 'head' has a line under it.

"Look at the second line: 'dog (blanket chain collar legs nose).' Two of these words tell what a dog *always* has. Which are they? (Pause for correct answer.) Yes, 'legs' and 'nose'; every one *draw a line under* the word 'legs' and another line under the word 'nose.'

"Look at the third line: 'house (cellar paint room servants walls).' Every one draw a line under each of the two words that tell what a house *always* has. (Pause.) What did you mark? Yes; the right words are 'room' and 'walls.' Pencils up!

"When I say 'Go,' do the others on this page yourself. Remember, *in each row draw a line under each of the two words, just TWO words, that tell what the thing always has.* Pencils up! Ready — Go!"

After ½ minute say, "Stop! Pencils up! Next there will be some more of the same kind. When I say 'Over,' you are to turn the page to Test 3 — just *one* leaf — and, when I say 'Go,' do as many as you can. Over! Look at the top of the page to see that it says 'Test 3.' Pencils up! Ready — Go!"

After 3 minutes say, "Stop! Pencils up!" (Pause.) Then say slowly, "Look at Exercise 4 on the next page."

4. Same–Opposite

"Look at the first sample at the top of the page: 'cold . . . . . hot.' Do they mean the same? (Pause for correct answer.) No, they are as different as can be; so there is a D between them. D is for 'Different.'

"Look at the next two: 'big . . . . . large.' Do they mean the same? (Pause.) Yes, they mean the same. S is for 'Same.' Every one put the letter S on the dotted line between 'big' and 'large.' Pencils up!

"Look at the next two: 'best . . . . . worst.' What goes between them? Yes; every one put a D on the dotted line between 'best' and 'worst.' Pencils up!

"When I say 'Go,' do the others on this page yourself. Remember, *if the two words mean the same, write the letter S on the dotted line between them. If they are as different as can be, write D between them.* Pencils up! Ready — Go!"

After ½ minute say, "Stop! Pencils up! Next there will be some more of the same kind. When I say 'Over,' you are to turn the page to Test 4 — just *one* leaf — and, when I say 'Go,' do as many as you can. Over! Look at the top of the page to see that it says 'Test 4.' Pencils up! Ready — Go!"

After 2 minutes say, "Stop! Pencils up!" (Pause.) Then say slowly, "Look at Exercise 5 on the next page."

5. Symbol–Digit

"Look at the first row of drawings with their numbers marked key, K–E–Y. Below each drawing there is a number that goes with that drawing. Now below the key there are two more rows of drawings. Look at the first drawing there in the first row below the key. Can you find the same drawing in the key? It has a 3 under it in the key; so a 3 has been put under it down in the first row. Look at the second drawing. A 1 has been put under it because there is a 1 under the same drawing in the key.

"Look at the next drawing. Is that the one that has a 4 under it in the key? (Pause for correct answer.) Yes, that is the drawing that goes with 4.

"Look at the next drawing; then look at the key to find out what number ought to be under it. What should it be? (Pause.) Yes, 6. Every one put a 6 under it. (Pause.)

"What number should go in the next square? (Pause.) Yes, 2. Every one write 2 in the next square. (Pause.) Pencils up!

"When I say 'Go,' do the others on this page yourself. Try to do BOTH rows. Remember, *make under each drawing the number you find under that drawing in the key.* Do each one as you come to it. Pencils up! Ready — Go!" (Examiner makes sure that no one stops at the end of the first row.)

After ½ minute say, "Stop! Pencils up! Next there will be some more of the same kind. When I say 'Over,' you

are to turn the page to Test 5, and, when I say 'Go,' do as many rows as you can. Over! Pencils up! Ready — Go!"

After 3 minutes say, **"Stop! Pencils up! Turn your books over.** (Examiner sees that this is done.) **Now pass the books forward."**

IV. DIRECTIONS FOR SCORING

The key gives the answers which are to be given credit. It consists of two pages, one containing the answers for Tests 1 to 4 and another for Test 5. In most cases the answers can be aligned with the pupil's answers. This device makes easier the comparison between the key and the pupil's answers, saves time, and lessens the eye-strain.

To secure accuracy, all scoring should be checked by a second scorer. It has been found that experienced scorers average about one error to an examination paper. Inexperienced scorers make many more mistakes.

Use of a colored pencil makes scoring more accurate and checking easier, since it distinguishes between marks made by the pupil and by the scorer. No marks should be made on the pupil's answer or where they tend to obscure it.

It is advisable in scoring to mark items which are *wrong* rather than those which are *right*. A check mark (√) may be used to indicate an answer that is not correct, except that in Test 4 an O should be used to indicate an *omission*. It is quicker and more accurate to count *wrongs* and *omissions* and to subtract them from the number of items attempted, than it is to count *correct* items. This procedure gives the number *right*, which in several cases is the final score to be recorded. However, in those tests for which the score is defined as *rights minus wrongs* it is necessary to take two more steps; namely, to count the *wrong* items separately and to subtract this number from the number *right* as obtained above. The result is the score for the test. The total score in the examination is the sum of the scores thus found for the five tests.

1. General Rules for Scoring

1. Each item marked by a pupil is scored either right or wrong, and no part credits are given, except in Test 3.

2. When an item evidently has been corrected by the pupil, the correction is the answer which should be scored.

3. The wrong and omitted items need not be indicated differently in scoring, except in Test 4, for which the score is rights *minus* wrongs and in which wrong and omitted items must be differently checked.

4. The scorer should indicate the last item attempted, by drawing a long line under that item and out into the margin.

5. No minus score is given for any test. If in Test 4 the number to be subtracted (number wrong) is greater than the number right, the score for the test is zero.

6. The number of right answers for each test (and the number wrong for Test 4) should be entered in the lower right-hand corner of the test page and encircled. When the scoring has been checked, a check mark may be made beside the circle.

7. The number of right answers to each test, as entered in the right-hand corner of the test page (and the number wrong for Test 4), should be copied into the spaces provided on the cover page and the indicated operations performed on that page — as, for example, multiplying the number right by 2, etc., to get the score for each test. The five scores thus obtained should then be added to find the total score.

2. Detailed Directions

Test 1. Arithmetical Reasoning

1. Score is number right times 2.

2. Answer may be written on dotted line or elsewhere near its problem.

3. If two answers are given to problem, count as wrong.

4. If it is clear that one answer has been put on the wrong line, and the next answers are all thereby misplaced, give credit for the answers that are right even if misplaced.

5. Omission of the dollar sign and other designations is permissible.

6. Omission of the decimal point is permissible if the dollar sign is omitted in Form 1, Items 6, 9, and 12; Form 3, Item 6; Form 4, Item 7.

Test 2. Sentence Completion

1. Score is number of correct sentences times 2.

2. Acceptable answers are listed in the key. A pupil may give a correct answer not in the key. It may be given credit, if the completed sentence is clearly correct; but if the slightest doubt exists, it should be marked wrong.

3. Answers not grammatically correct are wrong. Misspelled answers receive credit if otherwise correct.

4. Sentences, however sensible, are not correct unless only *one* word is written in each space.

Test 3. Logical Selection

1. To each item in which
   both words are correctly marked, give two points;
   one word is correctly marked, give one point;
   more than two words are marked, give no credit.

2. The total score for the test is the number of words correctly marked.

3. Any clear method of indicating answers is acceptable.

Test 4. Same–Opposite

1. Score is number right minus number wrong.

2. If all items in the test are marked S, or if all are marked D, the score is zero.

Test 5. Symbol–Digit

1. Multiply the number of correct digits by three tenths (.3). Record the nearest integer, discarding the decimal. Thus, with 46 correct digits, the test score is 14.

V. NORMS

The median or average score for each school grade or age is necessary to interpret pupils' scores on group intelligence tests. The median or average scores constitute "norms" in that they show the examiner what may be expected of the typical child of a given school grade or a given age.

The average score obtained from applying the tests to any limited group of pupils will vary not only with their grades and ages, but also with race, social class, the part of the country and the community in which they live, the time of year, and perhaps other factors. In other words, it is difficult to determine norms for the country as a whole.

This difficulty of laying down an ultimate standard score for any set of intelligence tests is less serious in effect than might at first appear. For immediate purposes of classification, the averages and the distributions obtained by each examiner for his own community are often more useful than those obtained from the country at large. Differences in the average level of intelligence in two cities are interesting and instructive, but in practice they are less important than the relation of each individual child to the norms of his own city or school. Intelligence "norms" are not "standards" to which children are to be brought by a process of training, like standards in spelling, writing, and arithmetic.

1. Age Norms

Table 1 presents age norms for Scale A — averages computed from scores of 32,372 pupils in 19 communities. No scores have been used from school systems in which the tests were not given in Grades 3 through 8.

TABLE 1

Age Norms (Averages) for Scale A (*Revised October*, 1922)

Age Last Birthday	Number of Cases	Norms
8	2116	46
9	4016	61
10	5028	76
11	5217	93
12	5330	109
13	5599	124 (122)
14	4542	133 (127)
15	524	136 (125)

Each age represents pupils who have reached that age but not the next birthday; e.g., Age 9 represents all pupils from 9 years, 0 months, through 9 years, 11 months, inclusive. Hence, the norm for that age corresponds to $9\frac{1}{2}$, the average age of 9-year-old pupils.

These age norms are to be understood to refer to white children of the ages cited who are found in public school systems in grades above the second. The norms in parentheses show averages when no pupils above the eighth grade are included. The norms for the lower ages, especially 8 and 9, are higher than they would be if there were included the duller pupils who have not yet reached the third grade.

Table 2 shows the average scores for 11-year-old pupils in 18 different school systems. The table illustrates the difficulty of determining norms that are universally applicable.

TABLE 2

Average Scores in National Intelligence Tests, Scale A, for Pupils Eleven Years of Age in Eighteen Different School Systems

Community	No. Pupils	Score	Community	No. Pupils	Score
A	830	108	J	146	90
B	213	108	K	185	90
C	18	103	L	31	89
D	276	98	M	31	89
E	24	98	N	442	85
F	1251	96	O	105	84
G	89	94	P	1320	84
H	89	92	Q	38	80
I	103	91	R	26	76

Note, by comparing Table 2 and Table 1, that the average 11-year-old pupil in City A is virtually identical in score with the "norm" for 12-year-old pupils; the average 11-year-old pupil in City P is about six months younger (in terms of "mental age") than the "norm," while the average pupil in the small school system R is almost exactly two mental years lower than the average pupil of the same chronological age in City A. The same divergences can be found within any large school system among the pupils in different buildings or different quarters of the city. All that can be said for the norms in Table 1 (or for similar norms published for other intelligence tests of school children) is that they represent fairly closely the averages that will be found in school systems generally when the results for cities, towns, villages, and rural communities are combined to afford a fair sampling of the public school population of the Northern states.

2. Mental Age Equivalents

Table 3 shows how to convert a score on the National Intelligence Test, Scale A, to a mental age. It is derived from Table 1 by interpolation.

These mental ages are analogous to mental ages derived from the Binet-Simon Scale, because in both cases what an average child can do determines the quantitative rating for a given mental age.[1]

[1] However, it does not follow that the two mental ages would always be identical, partly because, as already explained, the samples of 8- and 9-year pupils are not complete, and partly because the two tests are different in composition and procedure. A child of otherwise good ability who had not yet mastered reading well, would almost certainly show a higher mental age under Binet examination than under any group test that necessitates reading. For this reason it is recommended that

TABLE 3

FOR CONVERTING SCORES IN THE NATIONAL INTELLIGENCE TEST, SCALE A, INTO EQUIVALENT MENTAL AGES (*in Months*)

Score	N.I.T. M.A. Mos.	Score	N.I.T. M.A. Mos.	Score	N.I.T. M.A. Mos.	Score	N.I.T. M.A. Mos.	Score	N.I.T. M.A. Mos.
41	97	71	122	101	144	131	170	161	200
42	98	72	123	102	144	132	171	162	201
43	99	73	124	103	145	133	172	163	202
44	100	74	125	104	146	134	173	164	203
45	101	75	126	105	146	135	174	165	204
46	102	76	126	106	147	136	175	166	205
47	103	77	127	107	148	137	176	167	206
48	103	78	128	108	149	138	177	168	207
49	104	79	128	109	150	139	178	169	208
50	105	80	129	110	151	140	179	170	209
51	106	81	130	111	151	141	180	171	210
52	107	82	131	112	152	142	181	172	211
53	107	83	131	113	153	143	182	173	212
54	108	84	132	114	154	144	183	174	213
55	109	85	132	115	155	145	184	175	214
56	110	86	133	116	156	146	185	176	215
57	111	87	134	117	156	147	186	177	216
58	112	88	134	118	157	148	187	178	217
59	112	89	135	119	158	149	188	179	218
60	113	90	136	12	159	150	189	180	219
61	114	91	137	121	160	151	190	181	220
62	115	92	137	122	160	152	191	182	221
63	116	93	138	123	161	153	192	183	222
64	117	94	138	124	162	154	193	184	223
65	118	95	139	125	163	155	194	185	224
66	118	96	140	126	165	156	195	186	225
67	119	97	141	127	166	157	196	187	226
68	119	98	142	128	167	158	197	188	227
69	120	99	142	129	168	159	198	189	228
70	121	100	143	130	169	160	199	190	229

The brightness, or relative mental age, of the child may be, of course, computed by the usual formula:

$$\text{Intelligence Quotient (IQ)} = 100 \frac{\text{Mental Age (MA)}}{\text{Chronological Age (CA)}}$$

It is usually simpler to convert both mental age and chronological age into months before dividing. To facilitate this conversion, Table 4 is supplied.

Mental age equivalents for scores lower than 46 or higher than 136 may be estimated, but these involve questionable assumptions, are artificial, and do not accord with the method of deriving the mental ages. It is urged that use be made of the percentile ratings and the letter ratings mentioned farther on, rather than of the mental age equivalents, at least for above 136 and below 46.

when Table 3 is used, the result should be designated as "N.I.T.M.A." (National Intelligence Tests Mental Age) to distinguish it from the "Binet Mental Age." Incidentally it may be remarked that in such a case the Binet Tests might conceivably reflect general native ability more accurately, but the group tests might conceivably reflect his ability more usefully from the point of view of school classification.

TABLE 4

TABLE FOR CONVERTING YEARS AND MONTHS INTO MONTHS

Years	Months 0	1	2	3	4	5	6	7	8	9	10	11
7	84	85	86	87	88	89	90	91	92	93	94	95
8	96	97	98	99	100	101	102	103	104	105	106	107
9	108	109	110	111	112	113	114	115	116	117	118	119
10	120	121	122	123	124	125	126	127	128	129	130	131
11	132	133	134	135	136	137	138	139	140	141	142	143
12	144	145	146	147	148	149	150	151	152	153	154	155
13	156	157	158	159	160	161	162	163	164	165	166	167
14	168	169	170	171	172	173	174	175	176	177	178	179
15	180	181	182	183	184	185	186	187	188	189	190	191
16	192	193	194	195	196	197	198	199	200	201	202	203

3. ADJUSTMENT OF GRADE MEDIANS

Direct comparison between grades or cities can be made only when the testing is done at the same period of the school year. It is possible, however, to utilize the norms given for October testing so that they may be made the basis of comparison with scores obtained at any time in the school year. For this purpose allowance must be made in the first place for improvement due to mental growth from month to month. Computations based on over 7000 scores from five Michigan cities indicate that on the average 1.36 points may be allowed for each month of growth.[1] For example, if a fifth grade averages 76 in October, it may be assumed that it would have averaged 80 in January, three months later.

Allowance must also be made if tests are given in the second instead of the first semester. In most school systems more pupils enter in September than in February. Among pupils who enter at any period there is a greater tendency for pupils to become retarded than accelerated in their grade location. Furthermore, more are retarded by a half year than by a whole year, and more by a year and a half than by two years. The net effect is that in the grades under examination those groups that originally entered in February come to contain a larger percentage of repeaters than those that originally entered in September, and the scores of the former groups are therefore lower. The amount of allowance that must be made for the accumulation of repeaters in these grades that are thus "off schedule" has been found by examination of the scores of 5 Michigan cities to be approximately 2 points. There is in general a difference of approximately 2 points between a low fourth grade beginning work in September and a low fourth grade beginning the work of that grade in February.

If, therefore, the test has been given in any city in the second semester, to compare the scores with the norms or with the scores of another city in which the test was given in the first semester 2 points must be added to scores of pupils in the lower half of the grade and 2 points must be subtracted from scores of pupils in the upper half of

[1] In the lower third grade the allowance should be increased to 4 points and in the upper third grade to 2 points.

the grade. In addition to this semester adjustment, of course, there must also be made an adjustment to bring the scores to corresponding months in the two semesters. In illustration, the high fifth grade examined in Washington in June averaged 97. To compare this with the standard score for the high fifth grade examined in October, 2 points must be subtracted for the semester adjustment and then the result, 95, must be further corrected by subtracting 4 more points ($3 \times 1.36 = 4.08$), because June, the fifth month of the second semester, is three months later than October, the second month of the first semester. The corrected average is, therefore, 91, which can be directly compared with the norm for the grade in question. Where there are yearly promotions, this allowance for irregularity should be cut in half.[1]

4. Grade Norms

Table 5 presents grade norms. These norms are averages computed from results obtained from 57 communities, representing 37,069 pupils.

The method by which comparisons may be instituted of grade with grade or of city with city when the testing is done at other periods than October is fully described on page 6 of this Manual.

TABLE 5

Grade Norms (Averages) (*Based on October Examinations*)

Grade	No. of Cases	Norm
Low 3	2319	36
High 3	2008	49
Low 4	4608	63
High 4	2398	69
Low 5	5376	84
High 5	2154	89
Low 6	4592	102
High 6	2533	105
Low 7	4350	117
High 7	2132	124
Low 8	2832	130
High 8	1767	133
	Total 37069	

5. Age Percentiles

A convenient method of comparing the standing of two pupils in a test or of the same pupil in two or more tests is to translate the scores into percentiles. In making a percentile table, all the scores obtained from a given group — e.g., from pupils of a given age — are arranged in order of excellence and reduced to a theoretical 100 pupils. The percentile rank which is thus obtained for a given score indicates the percentage of pupils in the group that the pupil having that rank exceeds. Thus, the pupil whose score equals that assigned as the 92d percentile is of such a degree of excellence that he is surpassed by only eight pupils in one hundred. The 50th percentile is, of course, the median score, while the 25th and the 75th percentiles (known as Q_1 and Q_3) locate the boundary points between the first and the second and between the third and the fourth quarters, respectively.[1]

For the method of constructing a percentile graph from a series of test scores see Universal Percentile Graph.[2]

6. Letter Ratings

Many users of intelligence tests have found it convenient to designate the relative status of pupils by the use of a letter rating. Such ratings may be thought of as symbols for groups of percentiles. Thus, if the rating A is given to the top 8 per cent, it means substantially "having a percentile rank of 93 or above." In practice, the use of letter ratings simplifies the dealing with scores by reducing the number of elements to be kept in mind in handling cases for classification, for reporting to teachers, or for other administrative purposes.

The number of letter ratings to be employed and their boundaries will differ with administrative needs in different systems; but it should be noted in arranging letter ratings that the actual differences in intelligence are relatively small over a somewhat wide range of percentiles in the middle area of scores, whereas the differences are relatively large toward each end of the range of percentiles. It follows that relatively many pupils should be given the middle letter ratings and relatively few the extreme letter ratings. Further, from the nature of the approximately symmetrical curve of distribution, it follows that any letter-rating plan should consist of an odd number of symbols.

The plans shown in the table below are suggested.

TABLE 6

Symbol	Interpretation	Plan I		Plan II		Plan III	
		Range of Percentiles	Per Cent	Range of Percentiles	Per Cent	Range of Percentiles	Per Cent
A	Very Superior	93–100	8	98–100	3	96–100	5
B	Superior	81–92	12	91–97	7	86–95	10
C+	High Average	62–80	18	76–90	15	71–85	15
C	Average	39–61	24	26–75	50	31–70	40
C−	Low Average	21–38	18	11–25	15	16–30	15
D	Inferior	9–20	12	4–10	7	6–15	10
E	Very Inferior	1–8	8	1–3	3	1–5	5

Plan I represents a division that has been followed in Detroit and several other systems where it is desired (by combining A and B and combining D and E) to classify pupils into three sections (X, Y, and Z) containing 20, 60, and 20 per cent of the pupils, respectively.

Plan II represents a division that has been followed to advantage in certain school systems in which it has been

[1] For a general account of the construction of the National Intelligence Tests, the results obtained, and the derivation of mental ages and percentiles, see Dr. Guy M. Whipple, "The National Intelligence Tests," *Journal of Educational Research*, Vol. IV; June, 1921.

[1] A table of percentile standings based on over 30,000 scores may be obtained by writing to the publishers.

[2] Published by World Book Company, Yonkers-on-Hudson, New York.

found desirable to select for special treatment the top and the bottom 10 per cent of the pupils. This affords limiting boundaries that correspond in an average school system to Stanford Binet IQ's of approximately 85 and 115 and to National Intelligence Test IQ's of approximately 75 and 125. Certain types of special classes for dull and for bright pupils appear to operate to advantage when the selection is made at about these boundary points.

Plan III has the advantage of using multiples of 5 per cent for its limiting values. It may be preferred to Plans I and II if 10 per cent is deemed too few and 20 per cent too many pupils for special treatment in classification.

VI. TREATMENT AND USES OF INTELLIGENCE TEST SCORES

When the teacher has scored the tests, he should arrange them according to score. The score of the middle booklet is the median "middle score."[1] The median may be used to represent the attainment of the class; it is a representative measure. The score halfway between the median and lowest is the first quartile, and the score halfway between the median and the highest is the third quartile. For instance, in Table 7 the highest score is 103; the lowest is 50; while the median, or the score of the middle (16th) child, is 73. The score, 73, may be taken to represent the general level of the class. The quartiles lie between the 8th and 9th and the 23d and 24th scores; they are 65.5 and 79.

For a large class or for several classes together a distribution of the scores must be made by grouping them by five or ten points — as, for example, those from 20 to 24 inclusive or those from 20 to 29 inclusive, etc. A pupil's score may be "placed" in such a distribution to show roughly where he would stand in the group. As the numerical expression of a pupil's position among children of his own age or grade, the percentile rank may be used (the percentage of the pupils in the group that falls below his score).

It is, of course, possible to use the arithmetic mean score (obtained by adding all the scores together and dividing by the number of scores) to represent the general level of the class. The mean score of the class shown in Table 7 is 74.13.

With each package of tests is included a Class Record for recording and filing the test results, together with other data needed to interpret the scores. Thus, under "School Data" may be entered such things as "Repeater," "Transfer from rural school," etc., and under "Remarks and Recommendations" may be entered such things as "Short-sighted," "Recommend skip Grade 5B," etc. One Class Record should be used for each classroom.

The most important uses for the test scores are:

(1) *To classify pupils in accordance with their intelligence or ability to learn.* The variation in this respect among the children in any grade is very great, the brightest pupil often being four or more years higher in mental level than the dullest. It is obviously impossible to teach, either in the same words or at the same rate, children so very different in ability and degree of mental development. There are obvious advantages in sorting pupils of one grade into three or more intelligence groups — either into several classes or into several groups in one class. A group intelligence examination affords a ready and fairly reliable means of making such classification. Where possible, the most gifted pupils should be put in one or more special classes, and special classes should be formed for the dullest pupils.

TABLE 7

SCORES OF GRADE 4B, WASHINGTON, D. C. (*Examined in April*)

SCORES ARRANGED ALPHABETICALLY

Name	Score	Name	Score	Name	Score
N. A.	66	L. H.	72	P. L.	59
R. A.	78	C. H.	79	C. M.	100
C. B.	79	H. H.	50	E. McI.	79
R. B.	66	M. H.	82	L. M.	69
H. B.	96	E. H.	78	L. M.	52
W. C.	70	E. H.	73	H. M.	84
H. D.	78	R. J.	103	L. P.	74
V. D.	83	I. K.	60	C. R.	59
G. G.	63	J. K.	67	S. S.	63
W. H.	79	R. B. L.	65	R. T.	72
				L. W.	100

SCORES ARRANGED IN ORDER OF RANK

Name	Score	Name	Score	Name	Score
R. J.	103	H. D.	78	G. G.	63
C. M.	100	R. A.	78	S. S.	63
L. W.	100	L. P.	74	I. K.	60
H. B.	96	E. H.	73	C. R.	59
H. M.	84	L. H.	72	P. L.	59
V. D.	83	R. T.	72	L. M.	52
M. H.	82	W. C.	70	H. H.	50
C. B.	79	L. M.	69	Q_1,	65.5
C. H.	79	J. K.	67	Median,	73
W. H.	79	N. A.	66	Q_3,	79
E. McI.	79	R. B.	66	Mean,	74.13
E. H.	78	R. B. L.	65		

(2) *To discover abnormalities.* In a class taking its first intelligence test, a score which is very low compared with the age standard should always lead to inquiry as to its cause. The trouble may be defective sight or hearing rather than low intelligence, or the low score may indicate a psychopathic condition which seriously affects the child's school work and progress. Erratic scores, high on some tests, low on others, also show need for individual attention.

(3) *To discover probable causes of difficulty with unusual and troublesome children.* Anything unusual in the records of such children should be followed by careful individual examination for confirmation or explanation. In many cases a knowledge of the cause of the child's behavior enables the teacher to change it by comparatively simple but previously unthought-of means.

(4) *To offer vocational guidance,* not to specific trades or professions but along broad lines. The objective evidence from an intelligence test even when it merely confirms an impression is valuable because it is impersonal and definite.

[1] If there are two middle booklets, the median lies halfway between the scores of the two.

Haggerty Intelligence Examination

DELTA 2

FOR GRADES 3–9

Arranged and standardized by M. E. Haggerty, University of Minnesota

An adaptation of the Army Intelligence Examinations. Used in the Virginia School Survey

---

My name is..... I am a.....
First name Last name Write boy or girl

This is the.....day of.....19.....I am.....years old.

My next birthday will be.....19.....I am in.....half of Grade.....

The name of my school is..... The name of my city (county) is .....

The name of my state is.....

Do not turn this page until you are told to do so.

(To be read silently by pupils while examiner reads aloud)

This little book contains some exercises which will show how well you can do certain things. Some of the things are very easy and some are very hard. There are six exercises in all. You will be shown them one at a time and will finish each one before you see the next one. Do not turn any page until you are told to do so. As soon as you turn the page, lift your pencil, with your elbow on your desk, and do not put your pencil down until we have read the instructions and until I say, GO!

Now turn the page to Exercise 1.

Exercise	1	2	3	4	5	6	Total
Score							

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EXERCISE 6

Look at this sentence: People hear with the eyes — ears — nose — mouth.
The correct word is "ears," because it makes the truest sentence. In each of the sentences below you have four choices for the last word. Only one of them is correct. In each sentence draw a line under the one of these four words that makes the truest sentence. If you cannot be sure, guess. The first one is already marked as it should be.

France is in Europe Asia Africa Australia.

1 The **apple** grows on a **shrub vine tree bush** 1
2 The day before **Thursday** is **Tuesday Wednesday Friday Saturday** 2
3 **America** was discovered by **Drake Hudson Cabot Columbus** 3
4 The **first President** of the United States was **Lincoln Washington Jackson Garfield** 4
5 The **capital** of the **United States** is **New York Chicago Washington New Orleans** 5

6 **Wool** is obtained from **the ocean the ground a plant an animal** 6
7 The **Amazon** is a **river city mountain country** 7
8 **Boston** is in **Connecticut Rhode Island Maine Massachusetts** 8
9 The **capital** of **France** is **London Rome Paris Berlin** 9
10 The second month before **July** is **August May June April** 10

11 The number of days in a **year** is **144 287 365 412** 11
12 The **Leghorn** is a kind of **cow horse granite fowl** 12
13 **Charlie Chaplin** is noted as an **actor soldier preacher physician** 13
14 The commander of the **allied armies** was **Wilson Foch Lloyd George Hindenburg** 14
15 **Moses** was a great **Greek Roman Japanese Jew** 15

16 **Shakespeare** is noted as a **soldier statesman writer scientist** 16
17 A **pound of tea** usually costs about **10 cts. 5 cts. $2.00 50 cts.** 17
18 **Ivory** is obtained from **elephants oysters mines reefs** 18
19 The **Durham** is a kind of **horse cow goat sheep** 19
20 **Indigo** is a **food drink color fabric** 20

21 It is usually **coldest** at **sunrise sunset noon midnight** 21
22 The U. S. School for **army officers** is at **Annapolis West Point New Haven St. Paul** 22
23 **Leap year** comes every **two years four years six years eight years** 23
24 **Rubber** is obtained from **ore petroleum trees hides** 24
25 **Darwin** was most famous in **literature politics war science** 25

26 The **battle of Lexington** was fought in **1620 1775 1812 1864** 26
27 **Combustible** things will **rip fight burn break** 27
28 **Emeralds** are usually **red blue yellow green** 28
29 **Diamonds** are obtained from **mines reefs elephants oysters** 29
30 **Turpentine** is obtained from **rivers rocks trees animals** 30

31 The **saber** is a kind of **musket sword cannon pistol** 31
32 The **larynx** is in the **head neck shoulder abdomen** 32
33 **Larceny** is a term used in **medicine theology law pedagogy** 33
34 **Alfalfa** is a kind of **corn hay print rice** 34
35 **Maroon** is a kind of **food fabric drink color** 35

36 The **clarinet** is used in **music stenography lithography drawing** 36
37 The **mimeograph** is a kind of **typewriter copying machine phonograph pencil** 37
38 The constitution of the **league of nations** was written in **France Russia England Germany** 38
39 **Monogamy** is a term relating to **electricity business the family manufacture** 39
40 A **five-sided** figure is called a **scholium pentagon parallelogram trapezium** 40

Score .....

EXERCISE 1

DIRECTIONS.

1. Read this question: Do cats see? NO <u>YES</u>
   The right answer is Yes; so a line is drawn under Yes.
2. Read the next question: Is coal white? <u>NO</u> YES
   The right answer is No; so a line is drawn under No.

Below are a great many more questions. Read them carefully, one at a time, and draw a line under the right answer. When you are not sure, guess.

---

1. Do dogs run? YES NO
2. Can a doll sing? YES NO
3. Does the sun shine? YES NO
4. Do men drink water? YES NO
5. Are all apples red? YES NO
6. Does a table have legs? YES NO
7. Are eggs good to eat? YES NO
8. Are two more than four? YES NO
9. Are children's dresses always blue? YES NO
10. Are houses sometimes made of bricks? YES NO
11. Do soldiers ever live in camps? YES NO
12. Does it rain every morning? YES NO
13. Do all travelers have companions? YES NO
14. Is south different from north? YES NO
15. Do pupils attend school at midnight? YES NO
16. Does lightning sometimes occur at night? YES NO
17. Do guards ever take captives? YES NO
18. Are all barbers wealthy persons? YES NO
19. Does the country need patriotic citizens? YES NO
20. Should school teachers be continually tardy? YES NO
21. Are all swimming animals quadrupeds? YES NO
22. Is the development of trees ever stunted? YES NO
23. Is electricity used only for lighting? YES NO
24. Do all foreigners make good citizens? YES NO
25. Is the government of colonies important? YES NO
26. Are future events definitely predictable? YES NO
27. Is hospitality likely to be appreciated? YES NO
28. Are missionaries ever persecuted by natives? YES NO
29. Is a faithless commander deserving of reward? YES NO
30. Do governors ever issue proclamations? YES NO
31. Does the ascent of a mountain conduce to fatigue? YES NO
32. Do arguments arise over political questions? YES NO
33. Should a sentinel's challenge be ignored? YES NO
34. Are integrity and obedience virtues? YES NO
35. Are historians infallible? YES NO
36. Are "patriotism" and "elocution" synonyms? YES NO
37. Does allegiance imply loyalty? YES NO
38. Is surgery the vocation of diplomats? YES NO
39. Are all lunatics in penitentiaries? YES NO
40. Are judicial decisions ever enforced? YES NO

*Number right*_____
*Number wrong*_____
Number right **minus** *Number wrong*_____ (*Score*)

EXERCISE 5

This is a test of common sense. Below are sixteen questions. Three answers are given to each question. You are to look at the answers carefully; then make a cross in the square before the best answer to each question, as in the sample:

SAMPLE

Why do we use stoves? Because
- ☐ they look well
- ☒ they keep us warm
- ☐ they are black

Here the second answer is the best one and is marked with a cross. Begin with No. 1 and keep on until time is called.

---

1 Cats are useful animals, because
- ☐ they catch mice
- ☐ they are gentle
- ☐ they are afraid of dogs

2 Why are chairs made of wood? Because
- ☐ wood is cheap and light
- ☐ wood burns
- ☐ wood is easily broken

3 A house is better than a tent, because
- ☐ it costs more
- ☐ it is more comfortable
- ☐ it is made of wood

4 Shoes are made of leather, because
- ☐ it is tanned
- ☐ it is tough, pliable, and warm
- ☐ it can be blackened

5 Why judge a man by what he does rather than by what he says? Because
- ☐ what a man does shows what he really is
- ☐ it is wrong to tell a lie
- ☐ a deaf man cannot hear what is said

6 If you were asked what you thought of a person whom you didn't know, what should you say?
- ☐ I will go and get acquainted
- ☐ I think he is all right
- ☐ I don't know him and can't say

7 Why does it pay to get a good education? Because
- ☐ it makes a man more useful and happy
- ☐ it makes work for teachers
- ☐ it makes demand for buildings for schools and colleges

8 If the grocer should give you too much money in making change, what is the right thing to do?
- ☐ buy some candy from him with it
- ☐ give it to the first poor man you meet
- ☐ tell him of his mistake

☞ Go to No. 9 above.

9 If you are lost in a forest in the daytime, what is the thing to do?
- ☐ hurry to the nearest house you know of
- ☐ look for something to eat
- ☐ use the sun or a compass for a guide

10 The feathers on a bird's wings help him to fly, because they
- ☐ make a wide, light surface
- ☐ keep the air off his body
- ☐ keep the wings from cooling off too fast

11 Why are criminals locked up?
- ☐ to protect society
- ☐ to get even with them
- ☐ to make them work

12 Why should all parents be made to send their children to school? Because
- ☐ it prepares them for later life
- ☐ it keeps them out of mischief
- ☐ they are too young to work

13 Why do inventors patent their inventions? Because
- ☐ it gives them control of their inventions
- ☐ it creates a greater demand
- ☐ it is the custom to get patents

14 A train is harder to stop than an automobile, because
- ☐ it is longer
- ☐ it is heavier
- ☐ the brakes are not so good

15 We see no stars at noon, because
- ☐ they have moved around to the other side of the earth
- ☐ they are so much fainter than the sun
- ☐ they are hidden by the sun

16 Why is it colder nearer the poles than near the equator? Because
- ☐ the poles are always farther from the sun
- ☐ the sunshine falls obliquely at the poles
- ☐ there is more ice at the poles

*Score*_____

EXERCISE 2

Get the answers to these problems as quickly as you can. Use the side of this page to figure on if you need to.

SAMPLES
1 How many are 5 men and 10 men?.....Answer (15)
2 If one pencil costs 5 cents, what will 4 pencils cost?....Answer (20)

1 How many are 30 men and 7 men?.....Answer ( )
2 A boy had 10 cents and spent 4 cents. How many cents had he left?..Answer ( )
3 If you save $7 a month for 4 months, how much will you save?.....Answer ( )
4 If 24 men are divided into groups of 8, how many groups will there be?.....Answer ( )
5 A boy had 12 marbles. He bought 3 more, and then lost 6. How many marbles did he have left?.....Answer ( )
6 Mary was carrying a dozen eggs in her apron. Two eggs fell out and were broken. How many eggs had she left?.....Answer ( )
7 An army advanced 5 miles and retreated 3 miles. How far was it then from its first position?.....Answer ( )
8 How many hours will it take to drive a team 66 miles at the rate of 6 miles an hour?.....Answer ( )
9 How many apples can you buy for 50 cents at the rate of 2 for 5 cents?.....Answer ( )
10 A regiment marched 40 miles in five days. The first day it marched 9 miles, the second day 6 miles, the third 10 miles, the fourth 8 miles. How many miles did it march the last day?.....Answer ( )
11 If you buy two writing tablets at 7 cents each and a book for 65 cents, how much change should you get from a two-dollar bill?.....Answer ( )
12 If there are 5 school days in a week, 4 weeks in a month, and 9 months in a school year, how many school days are there in a school year?.....Answer ( )
13 A dealer bought some mules for $800. He sold them for $1000, making $40 on each mule. How many mules were there?.....Answer ( )
14 A rectangular bin holds 400 cubic feet of corn. If the bin is 10 feet long and 5 feet wide, how deep is it?.....Answer ( )
15 If it takes 6 men 3 days to dig a 180-foot drain, how many men are needed to dig it in half a day?.....Answer ( )
16 A soldier spent one eighth of his money for post cards and four times as much for a box of letter paper, and then had 90 cents left. How much money did he have at first?.....Answer ( )
17 If $3\frac{1}{2}$ tons of coal cost $21, what will $5\frac{1}{2}$ tons cost?.....Answer ( )
18 A ship has food to last her crew of 500 men 6 months. How long would it last 1200 men?.....Answer ( )
19 If a man runs a hundred yards in 10 seconds, how many feet does he run in a fifth of a second?.....Answer ( )
20 A submarine makes 8 miles an hour under water and 15 miles on the surface. How long will it take to cross a 100-mile channel, if it has to go two fifths of the way under water?.....Answer ( )

Score.....

EXERCISE 4

Look at these two words: little—small same—opposite

They mean the same thing; so a line is drawn under same.

Now look at the next two words: good—bad same—opposite

These two words do not mean the same. They mean just the opposite; so a line is drawn under opposite.

Now look at all the other words on this page. If the words of a pair mean the same or nearly the same, draw a line under same. If they mean the opposite or nearly the opposite, draw a line under opposite. If you cannot be sure, guess.

1	no—yes	same—opposite	1
2	big—large	same—opposite	2
3	leap—jump	same—opposite	3
4	day—night	same—opposite	4
5	cold—hot	same—opposite	5
6	wet—dry	same—opposite	6
7	in—out	same—opposite	7
8	wide—broad	same—opposite	8
9	bitter—sweet	same—opposite	9
10	slim—slender	same—opposite	10
11	go—leave	same—opposite	11
12	begin—commence	same—opposite	12
13	take—accept	same—opposite	13
14	find—lose	same—opposite	14
15	joy—happiness	same—opposite	15
16	asleep—awake	same—opposite	16
17	command—obey	same—opposite	17
18	beg—entreat	same—opposite	18
19	appeal—beseech	same—opposite	19
20	legible—readable	same—opposite	20
21	ancient—modern	same—opposite	21
22	lax—strict	same—opposite	22
23	acquire—lose	same—opposite	23
24	sacred—hallowed	same—opposite	24
25	compute—calculate	same—opposite	25
26	repress—restrain	same—opposite	26
27	bestow—confer	same—opposite	27
28	amenable—tractable	same—opposite	28
29	avert—prevent	same—opposite	29
30	contradict—corroborate	same—opposite	30
31	dearth—scarcity	same—opposite	31
32	prefix—append	same—opposite	32
33	amiable—surly	same—opposite	33
34	docile—refractory	same—opposite	34
35	celibate—married	same—opposite	35
36	extinct—extant	same—opposite	36
37	pertinent—relevant	same—opposite	37
38	diatribe—invective	same—opposite	38
39	apathy—indifference	same—opposite	39
40	fallacy—verity	same—opposite	40

*Number right*_____

*Number wrong*_____

Number right **minus** *Number wrong* ____ (*Score*)

EXERCISE 3

Each of these pictures has something missing, and you are to put in with your pencil the missing part. Look at the first one. It is the picture of a boy's face, but it has no mouth. Now with your pencil mark in a mouth. The woman has no eye. Give her an eye. The other pictures are to be finished in the same way.

A

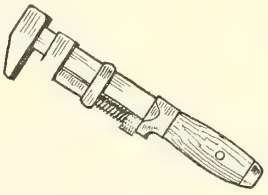
B

1

2

3

4



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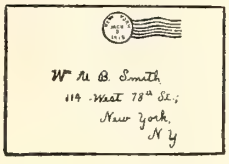

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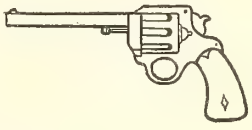

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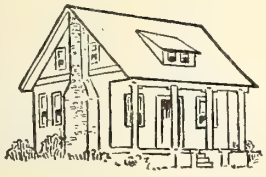

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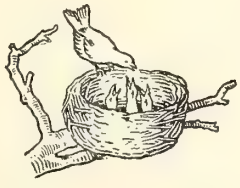

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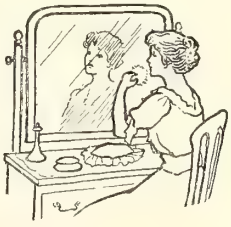

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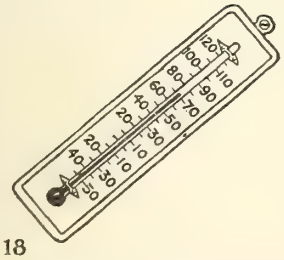

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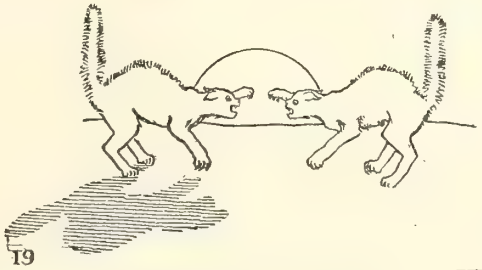

19

20

Score_____

OTIS GROUP INTELLIGENCE SCALE

4 3

Devised by Arthur S. Otis

PRIMARY EXAMINATION: FORM A

My name is.....

My birthday is.....

On my last birthday I was ..... years old.

I am in the ..... grade.

The name of my school is.....

The name of this city is.....

The date today is.....

(Do not write below this line.)

Remarks or Further Data

1.....

2.....

3.....

4.....

5.....

6.....

7.....

8.....

9.....

10.....

11.....

12.....

13.....

14.....

15.....

Test	Score
1	
2	
3	
4	
5	
6	
7	
8	
Total Score	
Norm	
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PR	

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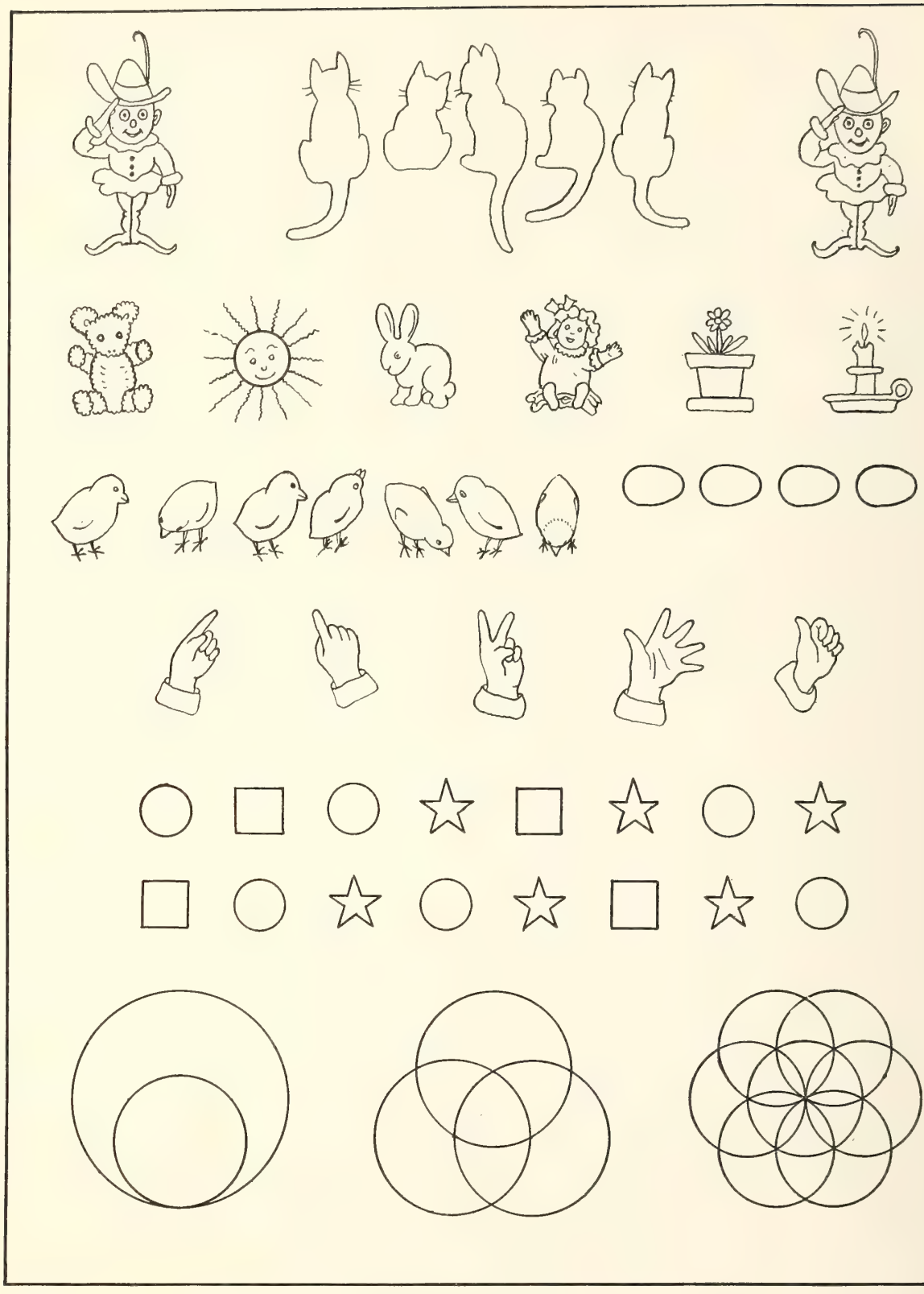

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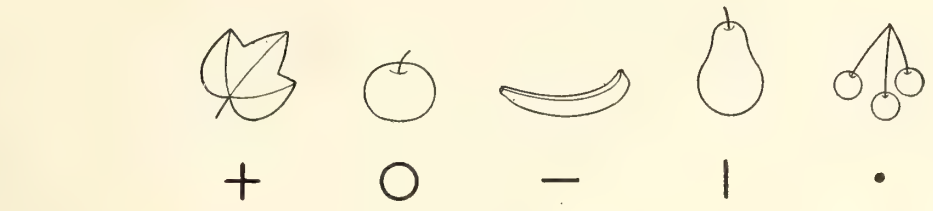

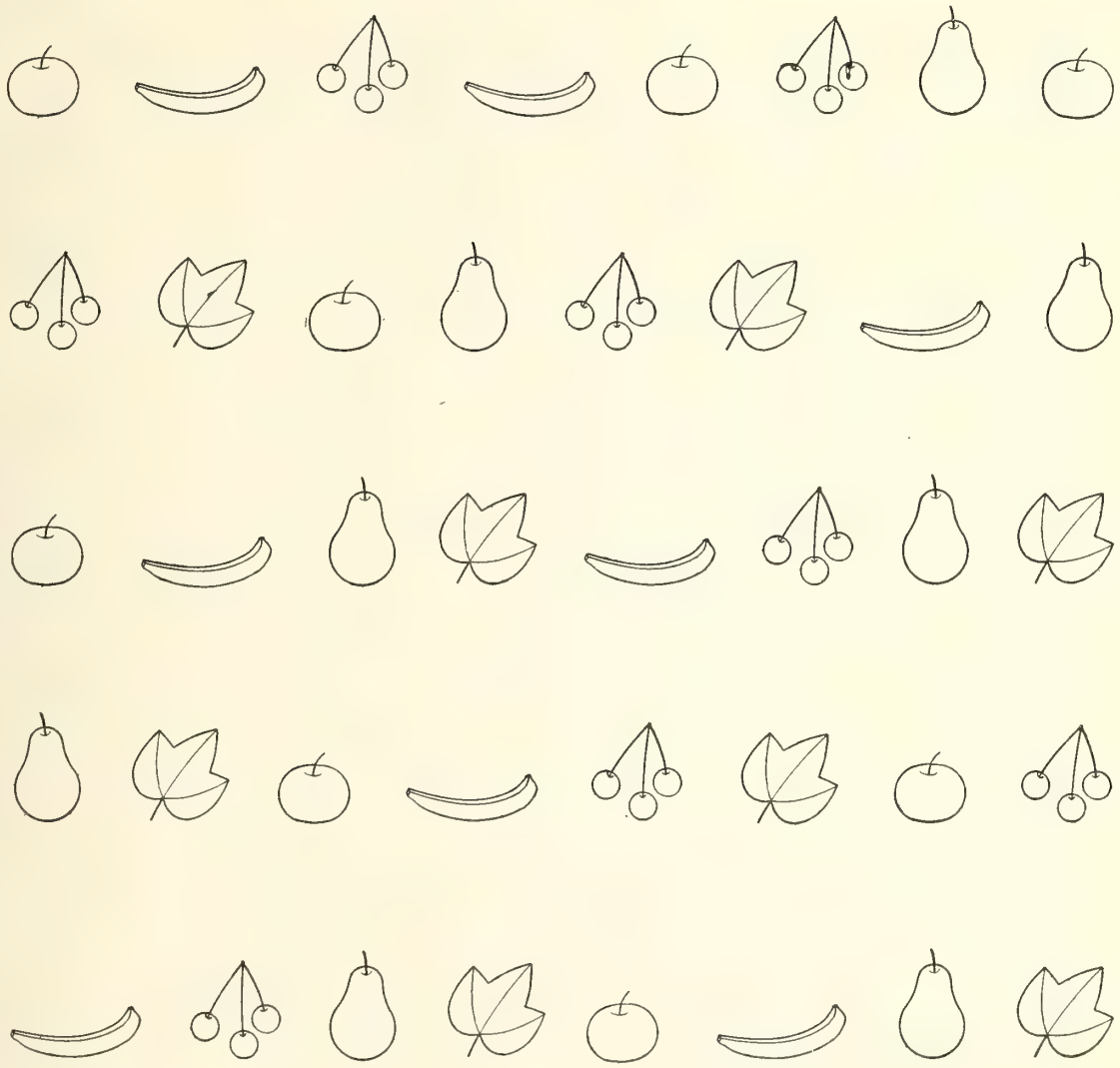

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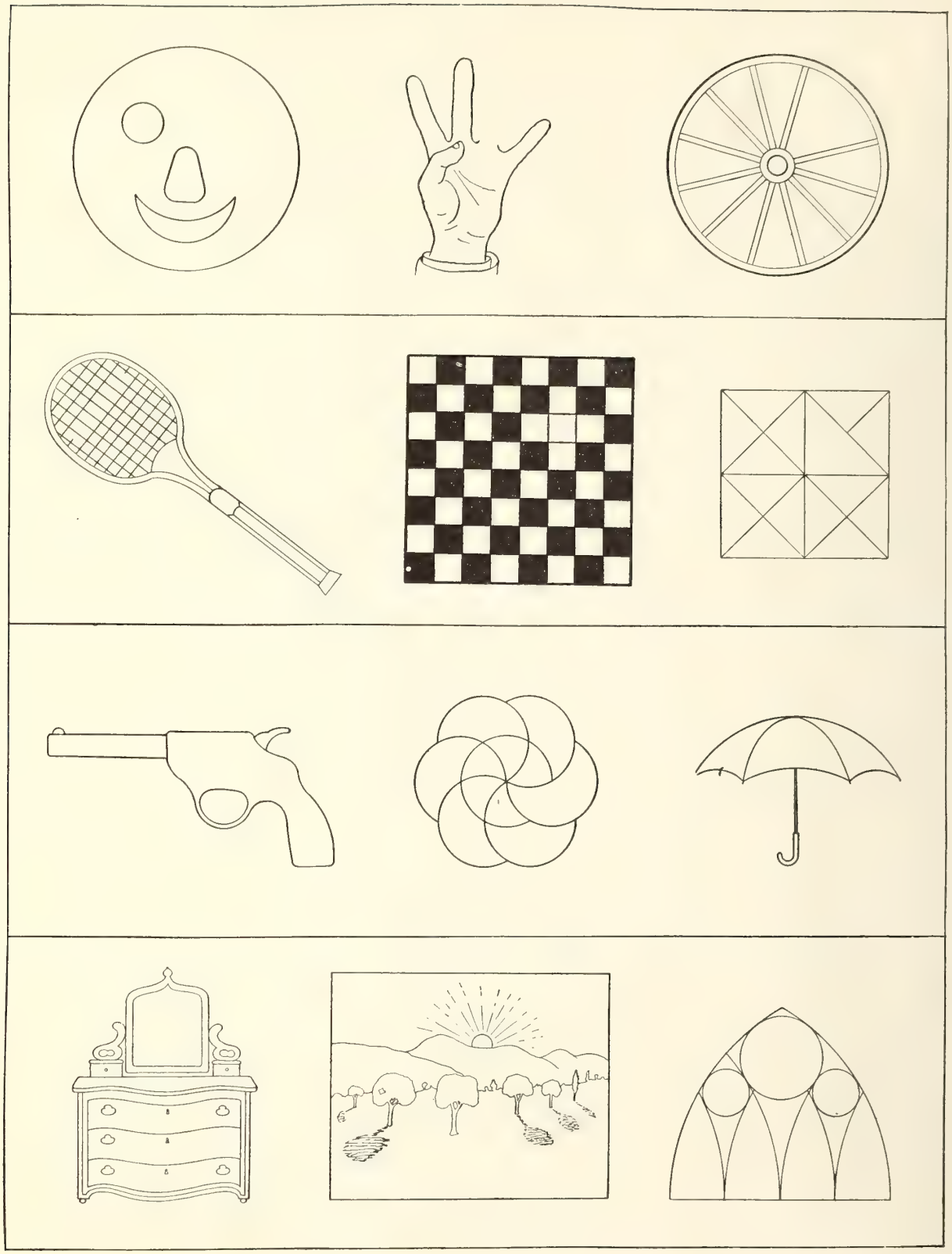

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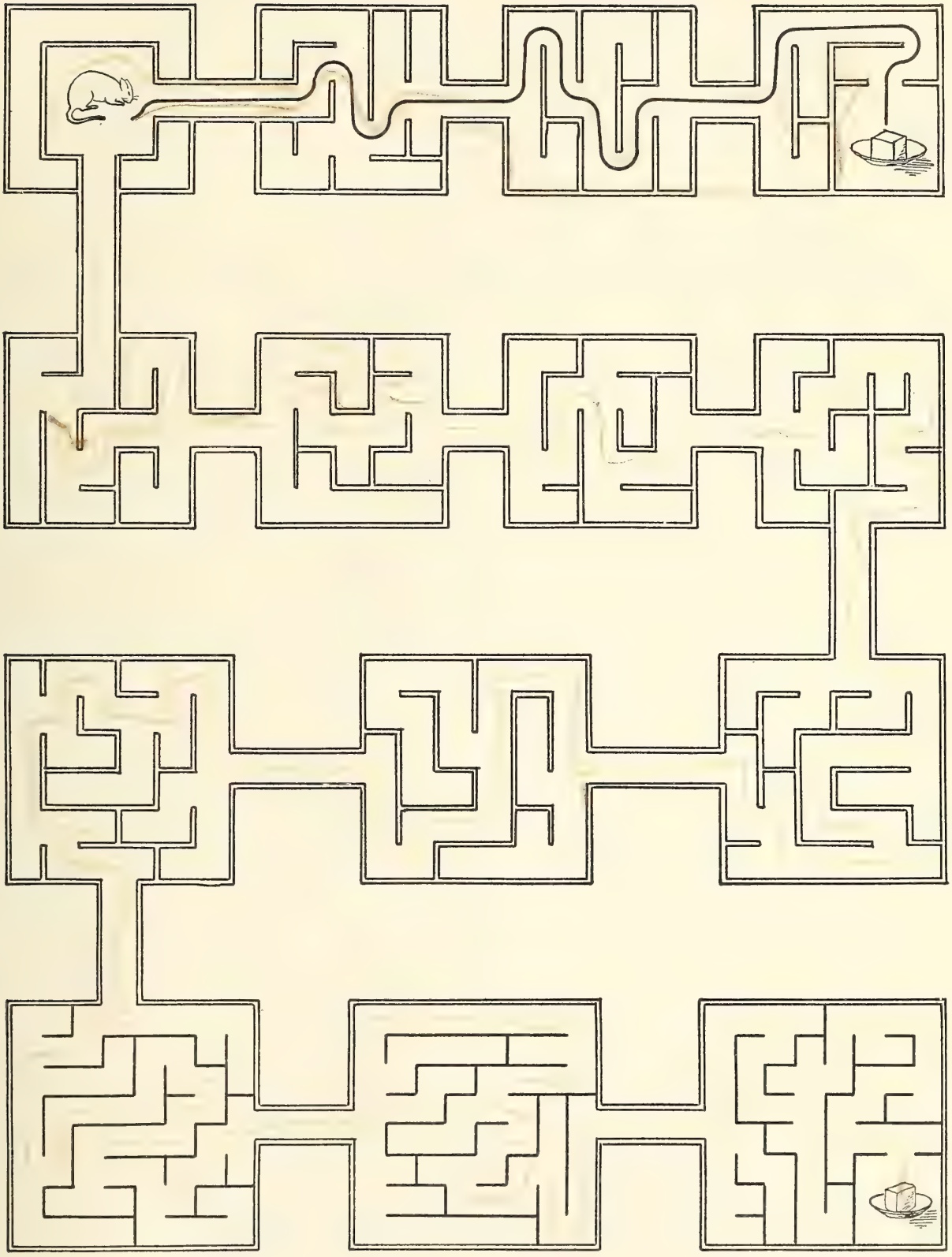

Score . . . . . .

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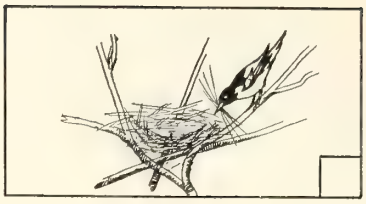

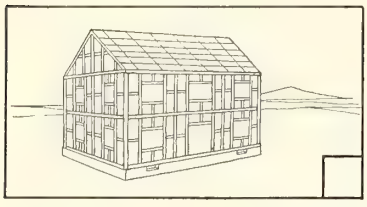
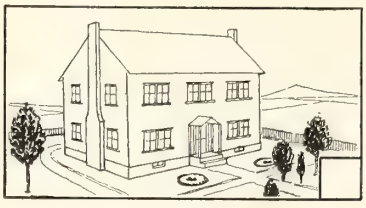
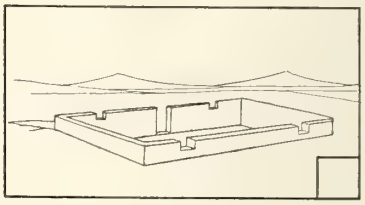
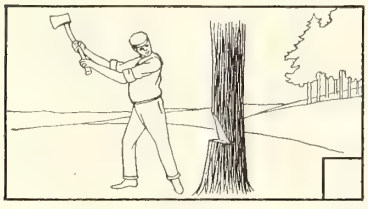

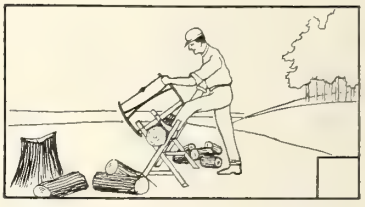
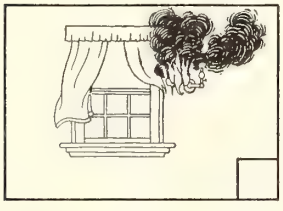
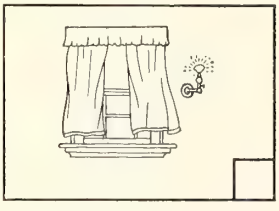
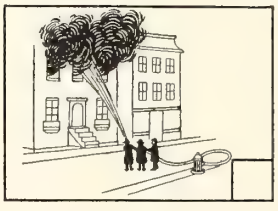
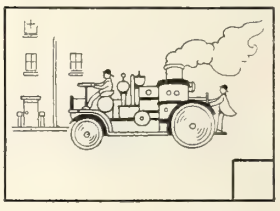
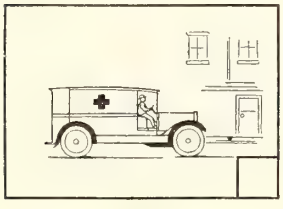
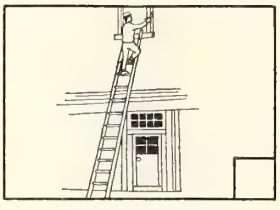

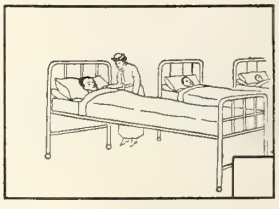

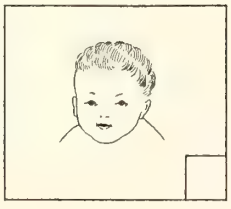
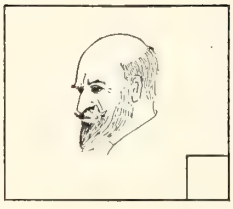

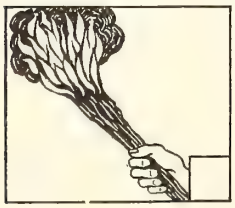
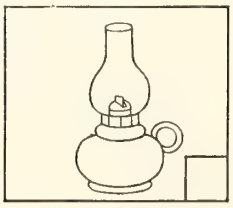
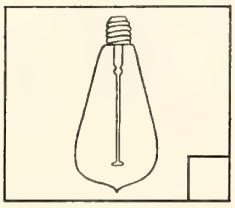
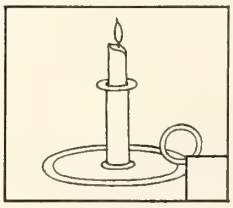
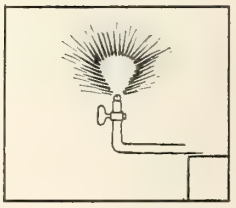

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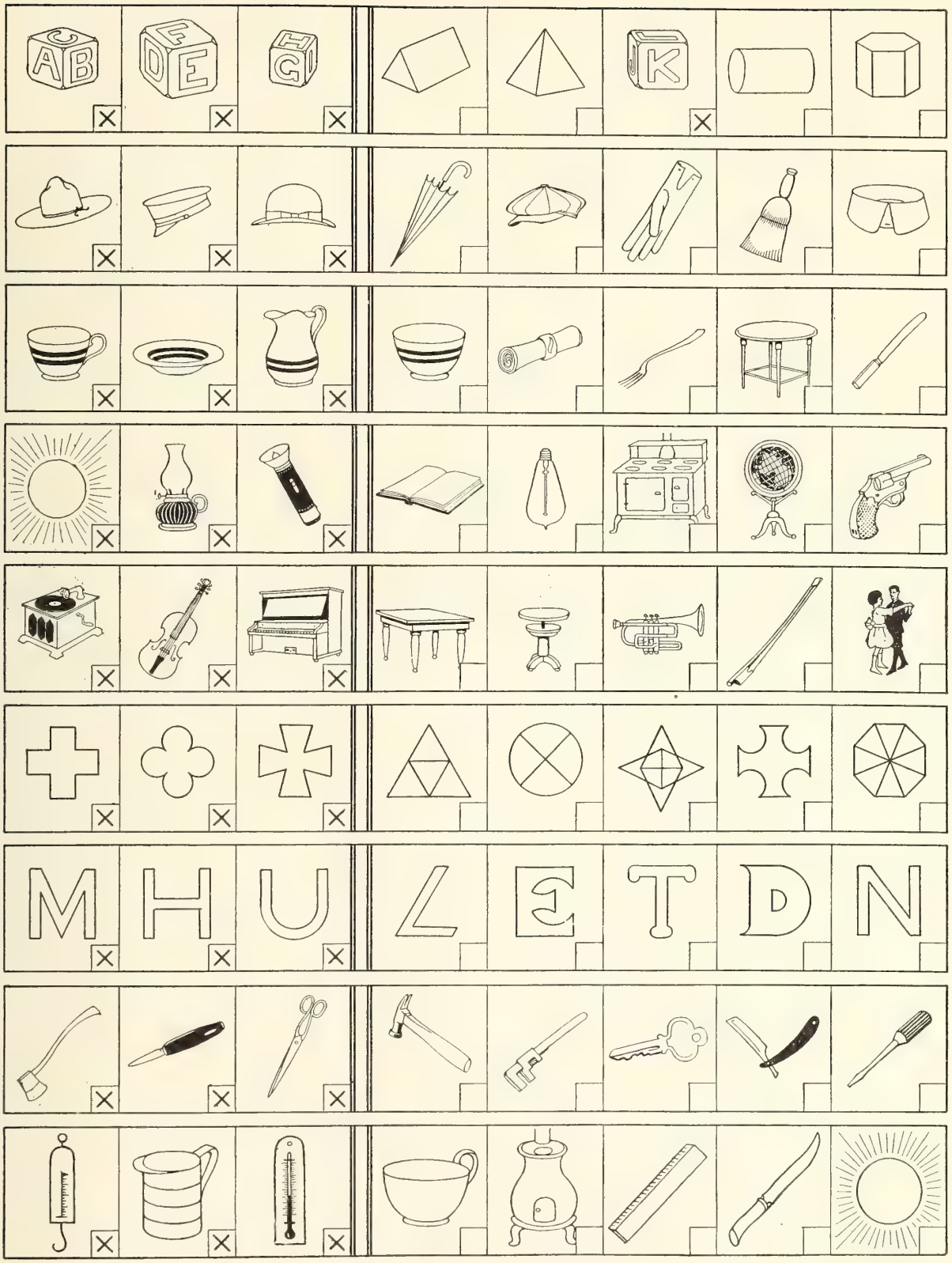

Score . . . . . .

A	s	o		K	1	2	3
B	s	o		L	1	2	3
C	s	o		M	1	2	3
D	s	o		N	1	2	3
E	s	o		O	1	2	3
F	s	o		P	1	2	3
G	s	o		Q	1	2	3
H	s	o		R	1	2	3
I	s	o		S	1	2	3
J	s	o		T	1	2	3

Score . . . . . *Score* . . . . . .

OTIS GROUP INTELLIGENCE SCALE

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MANUAL OF DIRECTIONS FOR PRIMARY EXAMINATION

CONTENTS

		PAGE
I.	General Procedure	1
II.	Directions for Administering	1
III.	Directions for Scoring	6
IV.	Determination of Norms	6
V.	Interpretation of Results	8
VI.	Uses of Intelligence Tests	9
	Key for Scoring	10–12

I. GENERAL PROCEDURE

The Otis Group Intelligence Scale is designed to test general mental ability. The scale is issued in two series, a Primary Examination and an Advanced Examination. The Primary Examination is designed especially for the Kindergarten and for Grades 1 to 4. The Advanced Examination is designed for Grades 5 to 12 — in fact, for all literate persons, including university students. To provide for reëxamination after a short interval without the scores being influenced by memory of the previous examination, and also to prevent collusion between groups successively examined, two forms of the test are available, Form A and Form B. These are different in substance but similar in structure, and the total scores from them are equivalent.

When it is inconvenient to give the entire test at one sitting, divide and administer in two sittings. The examination booklets should be distributed and the headings filled in as usual, and when the first half of the tests have been administered, the booklets should be collected immediately so that the pupils may not acquaint themselves with the remaining tests. The booklets should be collected in such a manner that, when the pupils are seated in the same seats for the second sitting, the booklets can be returned to them without confusion. At a later period the examination booklets may be distributed again and the examination completed without in any way vitiating results. For young pupils this method is of advantage in that it prevents fatigue.

Reëxamining

The method of examining pupils in groups is subject, of necessity, to certain limitations. It is impossible for the examiner to be sure in every case that he has the full and undistracted attention at all times of all the pupils being tested. While it is impossible for a really dull person to make a good score in the examination, it occasionally happens that a pupil tested with others in a group does not do himself justice. The most common reasons are nervousness, temporary confusion, or lapse of attention. For this reason, no score should be taken as absolute. Whenever the score of any pupil does not accord reasonably with the quality of his school work or other known facts about his mentality, he should be given further examination. Form B of the test, in both series, is available for this purpose. Sometimes a second testing in a group will reveal the fact that he was capable of making a better score. If a second examination is given within a short time after the first, a slight allowance should be made for so-called practice effect. If a pupil makes a second score which is more than ten points above the first, however, it is probable that his first score was vitiated in some way and was therefore too low.

Causes which vitiate a pupil's score commonly have the effect of increasing the variability of the pupil's test scores. For example, if a pupil has one or two zero test scores or very low ones along with others considerably above zero, it is probable that these low scores are caused by factors other than mere lack of intelligence. In order to discover whether this is not the case, the pupil may be examined individually and given only those tests in which he failed badly. In any other puzzling case, especially when it may be necessary to pronounce a pupil feeble-minded, an individual examination should be given.

Considerations Regarding Giving of Directions

In giving the directions for these tests, it is essential that every point be clearly understood by every one. This can be assured in no other way than by giving the directions slowly and distinctly, with proper expression and emphasis. Before an examiner gives a test for the first time, he should practice the directions several times, preferably with one or more listeners who are unfamiliar with the test. In order that the meaning of each sentence may be fully grasped, it should be followed by a pause. It is impossible to emphasize too strongly the need for these precautions. A good rule to follow is to allow a *pause of 2 seconds* after *every sentence.* The procedure may be considered as standardized only on the condition that the examiner makes an adequate pause after every sentence throughout the testing.

II. DIRECTIONS FOR ADMINISTERING

To administer the examination. begin by addressing the pupils as follows: **" We are going to give you some booklets now, and we will tell you pretty soon what you are to do with**

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them. While they are being passed you may look at the first page, but do not open them until you are told to."

Have monitors pass the booklets, one to each pupil, right side up. If the pupils can write, have them fill in the blanks, telling their names, birthdays, ages, etc. Give any help that will facilitate. It might be well to fill in the blanks beforehand on booklets for those pupils who cannot write.

When blanks are filled in, say,[1] **" Now lay your pencils down and listen a moment, while I read to you about what you are to do. In these booklets are some pictures and drawings and other interesting things. We want to see if you can answer some questions about the pictures and drawings. Also you will be told to make certain marks in certain places in the booklets and we want to see if you can do exactly what you are told to do, and how quickly you can do it.**

" Now in order to play this little game fairly, nobody must look to see what any one else is doing. That isn't fair. We want to find out what you can do all by yourself. You must listen very carefully to everything I say, so that you will be sure to hear the first time, because I will not repeat anything. Do not ask any questions. We will take one page at a time. I will tell you when to turn the page, and you must not turn any page until you are told to."

Test 1. Following Directions [*Form A*]

(For Form B, see below)

" Now turn over to the next page — the one with pictures of little men in the corners.[2] Here you see pictures of many things. I am going to tell you something to do with your pencils, on this page, and I want to see if you can do exactly what I say. Listen carefully while I tell you what to do, and then do it as quickly as you can. Notice the pictures at the top of the page. (1) **Now take your pencils and put a tail on the kitty that has no tail."** (Pause 5 seconds.)

" Remember not to look around. That isn't fair.

(2) **" Now look at the little man in the upper right-hand corner and draw a line for him to stand on."** (Pause 5 seconds.)

(3) **" Now look at the next row of pictures and draw a circle around the doll."** (Pause 5 seconds.)

(4) **" Next find the picture of something that can run, and draw a line under it."** (Pause 5 seconds.)

(5) **" Next find the picture that is between the doll and the candle and make a little cross under it."** (Pause 5 seconds.)

(6) **" Next find the picture of something that gives light and can be picked up. Make a round dot under it."** (Pause 5 seconds.)

(7) **" Next draw a line from the teddy bear's ear to the rabbit's ear that will go under the sun."** (Pause 5 seconds.)

(8) **" Next find the picture of a child's plaything that has large ears, and put a little circle under it."** (Pause 10 seconds.)

(9) **" Now notice the chicks and eggs and draw more eggs so that there will be as many eggs as there are chicks."** (Pause 10 seconds.)

(10) **" Next find the two chicks that look most alike and cross out the one between them."** (Pause 5 seconds.)

(11) **" Now notice the pictures of hands and draw a ring around the picture of a right hand."** (Pause 5 seconds.)

(12) **" Next, in the two rows of little drawings below the hands, cross out each circle that has a star under it."** (Pause 10 seconds.)

(13) **" Next make a dot in each square that is between two stars."** (Pause 10 seconds.)

(14) **" Now notice the large circle with a smaller circle in it. Put a cross in the space that is in the large circle but not in the smaller circle."** (Pause 5 seconds.)

(15) **" Next, in the middle drawing, put a cross in the space that is in all three circles."** (Pause 5 seconds.)

(16) **" Next, in the third drawing, in the corner, count *all* the circles, and write the number below the drawing."** (Pause 10 seconds.)

Test 2. Association [*Form A*]

" Now look at the next page. Notice the first row of pictures at the top of the page. There is a leaf with a little cross under it, an apple with a little circle under it, a banana with a line under it, a pear with an up-and-down line under it, and some cherries with a dot under them. You are to put the same marks under the same pictures below the line. Look at the next row of pictures. There you see an apple, banana, cherries, etc. Put a little circle under the apple, like the circle under the apple in the top row." (Pause 5 seconds.)

" Now put a line under the banana just like the line under the banana in the top row." (Pause 5 seconds.)

" Now put a little round dot under the cherries just like the dot under the cherries in the top row." (Pause 5 seconds.)

" Now put under the next banana the same kind of line that is under the other bananas." (Pause 5 seconds.)

" Now what goes under the apple? If you know, raise your hand." Call for an answer, and when the right answer is given say, **" Yes, a little circle, the same as before. Put the little circle under the apple."** (Pause 5 seconds.)

" Now put under the cherries the mark that belongs under them and do the same with the pear and apple." (Pause 10 seconds.)

" Then go right on with the other four rows and put under each picture the mark that belongs under it. Work fast and see how many you can get done before I say stop." After

[1] All passages to be read to the pupils are given in bold type. For the sake of uniformity, these should be strictly adhered to.

[2] The examiner will realize that the administration of the test is standardized only when the directions are read at a standard rate. This is such that the reading of the first paragraph — without allowing time for turning the page — is slightly more than half a minute. The examiner should time his reading of this paragraph and gauge the rate of reading accordingly. If less than one-half minute is taken, the reading rate is too rapid and may vitiate the scores in the test.

1 minute say, **" Stop. Lay down your pencils."** (Pause.[1]) **" Turn to the next page."**

Test 1. Following Directions [*Form B*]

" Now turn over to the next page — the one with pictures of little men in the corners.[2] Here you see pictures of many things. I am going to tell you something to do with your pencils on this page, and I want to see if you can do exactly what I say. Listen carefully while I tell you what to do, and then do it as quickly as you can. Notice the pictures at the top of the page. (1) Take your pencils and put a tail on the kitty that has no tail." (Pause 5 seconds.)

" Remember not to look around. That isn't fair.

(2) **" Now look at the little man in the upper left-hand corner, and draw a line for him to stand on."** (Pause 5 seconds.)

(3) **" Now look at the next row of pictures, and draw a circle around the rabbit."** (Pause 5 seconds.)

(4) **" Next find the picture of something that has hands, and draw a line under it."** (Pause 5 seconds.)

(5) **" Next find the picture that is between the sun and the rabbit, and make a little cross under it."** (Pause 5 seconds.)

(6) **" Next find the picture of something that grows but cannot see, and make a round dot under it."** (Pause 10 seconds.)

(7) **" Next draw a line from the doll's hand to the flower in the flower pot that will go under the candle."** (Pause 5 seconds.)

(8) **" Next find the picture of something that gives light but cannot be touched, and put a little circle under it."** (Pause 10 seconds.)

(9) **" Now notice the chicks and eggs, and draw more eggs so that there will be as many eggs as there are chicks."** (Pause 10 seconds.)

(10) **" Next find the two chicks that look most alike, and cross out the one between them."** (Pause 5 seconds.)

(11) **" Now notice the pictures of hands, and draw a ring around the picture of a right hand."** (Pause 5 seconds.)

(12) **" Next, in the two rows of drawings below the hands, make a dot in each circle that is between two stars."** (Pause 10 seconds.)

(13) **" Next cross out each star that has a circle under it."** (Pause 10 seconds.)

(14) **" Now notice the large circle with a smaller circle in it. Put a cross in the space that is in the large circle but not in the smaller circle."** (Pause 5 seconds.)

(15) **" Next, in the middle drawing, put a cross in the space that is in the two lower circles but not in the upper circle."** (Pause 10 seconds.)

(16) **" Next, in the third drawing, in the corner, count *all* the circles, and write the number below the drawing."** (Pause 10 seconds.)

Test 2. Association [*Form B*]

" Now look at the next page. Notice the first row of pictures at the top of the page. There is a pair of scissors with a little cross under it, a ball with a little circle under it, a spoon with a line under it, a bottle with an up-and-down line under it, and a spool with a dot under it. You are to put the same marks under the same pictures below the line. Look at the first row of pictures below the line. There you see a ball, spool, spoon, etc. Take your pencils and put a little circle under the ball, like the circle under the ball in the top row." (Pause 5 seconds.)

" Now put a line under the spoon just like the line under the spoon in the top row." (Pause 5 seconds.)

" Now put a little round dot under the spool just like the dot under the spool in the top row." (Pause 5 seconds.)

" Now put under the next spoon the same kind of line that is under the other spoons." (Pause 5 seconds.)

" Now what goes under the ball? If you know, raise your hand." Call for an answer, and when the right answer is given say, **" Yes, a little circle, the same as before. Put the little circle under the ball."** (Pause 5 seconds.)

" Now put under the spool the mark that belongs under it, and do the same with the bottle and ball." (Pause 10 seconds.)

" Then go right on with the other four rows and put under each picture the mark that belongs under it. Work fast and see how many you can get done before I say stop." After **1** minute say, **" Stop! Lay down your pencils."** (Pause.[1]) **" Turn to the next page."**

Test 3. Picture Completion [*Forms A and B*]

" On this page are twelve pictures. Something is left out of each picture. Look at the first picture and think what is left out. If you know, raise your hand." Call on a pupil for the answer. Then say, **" Yes, one eye is left out. Draw in the eye where it should go."** (Pause 5 seconds.) **" Now there is just one thing left out of each picture. Look at each of the other pictures and, as quickly as you can, draw in what is left out. See how many you can get done before I say ' Stop.' Ready, go."** After **2** minutes say, **" Stop! Lay your pencils down and look at the next page."**

Test 4. Maze [*Forms A and B*]

" Here you see pictures of little square boxes with walls in them and little paths between the walls. In the box in one upper corner you see a little mouse, and in the other upper corner is a piece of cheese. And there is a line from the mouse to the cheese, showing just how the mouse would have to go, around through the paths, to get to the cheese.

[1] At this point there is no harm in relieving the disappointment of those who did not finish by asking, "How many finished the second row? Third row? Fourth row?" etc. Note when about half the hands have been lowered, and then say, "If you finished that many rows, you did very well."

A similar moment of relief and opportunity for questioning is permissible after each test, provided the examiner will see that no pupil takes the opportunity to look at the paper of another.

[2] See footnote to Test 1, Form A.

[1] See footnote to Test 2, Form A.

The line shows the *only* way to get to the cheese. If the mouse went into any other path, he would run up to a wall and have to turn and go back to the right path.

" Now you will see another piece of cheese in the box in the *lower* corner of the page. How would the mouse get to that piece of cheese? When I say ' Ready,' you are to draw a line to show just where the mouse would have to go to get to this other piece of cheese, in the lower corner. Be very careful not to go into any wrong path. See how far you can get before I say ' Stop,' without crossing over any wall or going into any wrong path. Ready, begin." After 2 minutes say, " Stop! Lay your pencils down." (Pause if desired.) " Turn to the next page."

Test 5. Picture Sequence [*Forms A and B*]

" Look at the three pictures at the top of the page. They tell a little story about a bird building a nest and hatching out some little birds. You can see that the pictures are not in the right order. Think which one should come first." Call on a pupil, and when the right answer is given, say, " Yes, the bird has to build her nest first, so put a figure 1 in the picture where the bird is building her nest. Put it in the small square in the lower corner of the picture." (Pause 5 seconds.) " Now which picture comes next? " Call on a pupil, and when the right answer is given, say, " Yes, so put a figure 2 in the picture of the nest with the eggs in it, and put a figure 3 in the picture of the nest with the little birds in it. Always put the number in the small square in the corner of the picture." (Pause 5 seconds.) " Now you are to do the same with all the other rows of pictures. In each row, find the picture that should come first and put a figure 1 in the corner of that picture. Then put a figure 2 in the picture that should come next, and so on. See how many rows you can get done before I say ' Stop.' Go ahead." After 2 minutes say, " Stop! Lay your pencils down and look at the next page."

Test 6. Similarities [*Forms A and B*]

" Look at the first row of pictures. You will see that they are all little wooden blocks. The three blocks together on this side with little crosses under them (hold up booklet and point so all may see) are alike, because they are all square blocks with letters on them. How many see another block in that row that is like the first three? Raise your hands." Call on a pupil, saying, " Which one is it? " When the right answer is given, say, " Yes, it is the one with the letter K on the front, isn't it? and there is a little cross in the corner to show that that is the right answer.

" Now look at the second row of pictures. The first three, that have little crosses under them, are alike. Look at the other five and pick out the right answer — the one that is *most like* the first three. Put a cross in the little square in the corner under the answer." (Pause 5 seconds.)

" Now in each row below, in the same way, look at the first three pictures and see how they are alike, then put a cross under the answer — the one that is *most like* the first three. Remember, there is only *one* right answer in each row. Go ahead and work fast." After 2 minutes say, " Stop! Turn over to the last page." (Pause for short rest, if desired.)

Test 7. Synonym-Antonym [*Forms A and B*]

" Notice on the side of the page the letters, A, B, C, D, E, and so forth, and after the letter A the letters S and O, and after B the letters S and O, and so on. The letter A stands for two words I shall read. You are to think whether they mean the same, like *quick* and *fast*, or whether they mean the opposite, like *yes* and *no* or like *good* and *bad*. If they mean the same, you are to draw a line around the letter S, after the A. But if they mean the opposite, you are to draw a line around the letter O. The two words are *up* and *down*. Should you draw the line around the S or the O? " Call on a pupil, and when right answer is given, say, " Yes, *up* and *down* mean the opposite; so draw a line around the O." (Pause 5 seconds.) " Now we will go on in the same way." (For Form B, see below.)

[*Form A*]

" Question B. Put your finger on B — the two words are *large* and *big*. Draw the line around the right letter to show whether they mean the same or the opposite." (Pause 5 seconds.)

" Question C. Put your finger on C — the two words are *pleasant* and *agreeable*." (Pause 5 seconds.)

" Question D. *North* and *south*." (Pause 5 seconds.)

" Question E. *Strange* and *common*." (Pause 5 seconds.)

" Question F. *Empty* and *vacant*." (Pause 5 seconds.)

" Question G. *Awkward* and *clumsy*." (Pause 5 seconds.)

" Question H. *Sensible* and *foolish*." (Pause 5 seconds.)

" Question I. *Same* and *different*." (Pause 5 seconds.)

" Question J. *Courage* and *bravery*." (Pause 5 seconds.)

[*Form B*]

" Question B. Put your finger on B — the two words are *tall* and *high*. Draw the line around the right letter to show whether they mean the same or the opposite." (Pause 5 seconds.)

" Question C. Put your finger on C — the two words are *ordinary* and *common*." (Pause 5 seconds.)

" Question D. *Pleasant* and *disagreeable*." (Pause 5 seconds.)

" Question E. *Forget* and *remember*." (Pause 5 seconds.)

" Question F. *Deceive* and *lie*." (Pause 5 seconds.)

" Question G. *Liberty* and *freedom*." (Pause 5 seconds.)

" Question H. *Same* and *opposite*." (Pause 5 seconds.)

" Question I. *Capture* and *escape*." (Pause 5 seconds.)

" Question J. *Justice* and *fairness*." (Pause 5 seconds.)

Test 8. Common Sense [*Forms A and B*]

" Now notice on the other side of the page the letters K, L, M, N, O, and so on, and after each letter the numbers 1, 2,

and 3. Each letter stands for a question I shall read to you. I am going to read three answers to each question. If answer No. 1 is the right one, you are to draw a line around the number 1. If answer No. 2 is the right one, draw a line around the number 2. But if answer No. 3 is the right one, draw a line around the number 3. The first question is: Why do birds build nests? These are the answers. Think which is the right one. Answer No. 1: Because they like to work. Answer No. 2: To make a place to lay their eggs. Answer No. 3: To keep other birds away. Now which is the right answer, No. 1, 2, or 3?" Call on a pupil, and when the right answer is given, say, "Yes, answer No. 2 is the right one, because birds build their nests to lay their eggs in. So draw a line around the number 2 after the letter K." (Pause 5 seconds.) (For Form B see below.)

[*Form A*]

"Now I will read question L. Keep your finger on the letter L while I read. Think which answer is the right one and draw a line around the right letter. Question L: If you hurt some one without meaning to, what should you do?

One: Say you didn't do it.
Two: Beg his pardon.
Three: Run away." (Pause 5 seconds.)

"Question M: Why is it a good thing to brush our teeth?

One: So we can have a toothbrush.
Two: Because tooth paste has a pleasant taste.
Three: To keep our teeth clean and white." (Pause 5 seconds.)

"Question N: Why do people take baths?

One: They enjoy it.
Two: To make use of the bathtub.
Three: It is healthful." (Pause 5 seconds.)

"Question O: Why would most people rather have an automobile than a horse and carriage?

One: Automobiles have rubber tires.
Two: They go faster.
Three: They use gasoline." (Pause 5 seconds.)

"Question P: Why do men raise their hats when they meet women they know?

One: They learned to do it when they were boys.
Two: It is considered polite.
Three: To show their hair is brushed." (Pause 5 seconds.)

"Question Q: Why do automobiles keep to the right side of the street?

One: It is the custom and is easier for them to pass one another.
Two: The road is smoother on that side.
Three: They are not so likely to run over people." (Pause 5 seconds.)

"Question R: Why are streets lighted at night?

One: So people can see where they are going.
Two: Because children are afraid of the dark.
Three: Because dark streets are colder." (Pause 5 seconds.)

"Question S: In what way are fish like pigeons?

One: They have feet to walk with.
Two: They have two eyes.
Three: They can swim and fly." (Pause 5 seconds.)

"Question T: Why should we not pick up a kitten by its tail?

One: It doesn't look well.
Two: It hurts the kitty.
Three: Its tail might come off." (Pause 5 seconds.)

"Now lay your pencils down and turn your booklets over to the front page." Have monitors collect the booklets.

[*Form B*]

"Now I will read question L. Keep your finger on the letter L while I read. Think which answer is the right one and draw a line around the right letter. Question L: Where is the sun at night?

One: It is behind heavy clouds.
Two: It is on the other side of the earth.
Three: It has set in the ocean." (Pause 5 seconds.)

"Question M: If you buy two cents' worth of candy and give the store man a nickel, how many pennies should he give you back?

Answer No. 1: One penny.
Answer No. 2: Two pennies.
Answer No. 3: Three pennies." (Pause 5 seconds.)

"Question N: If you gave a newsboy twenty-five cents for a three-cent newspaper, what would be the right change?

One: Three nickels.
Two: Two dimes.
Three: Two dimes and two pennies." (Pause 5 seconds.)

"Question O: Which would most people rather hear?

One: A factory whistle.
Two: A piano playing.
Three: A church bell." (Pause 5 seconds.)

"Question P: When is the best time to mend a leaky roof?

One: While it is raining.
Two: As soon as the roof is dry after the rain.
Three: Just before it rains again." (Pause 5 seconds.)

"Question Q: There is a saying that it is hard to teach an old dog new tricks. This means,

One: It is easier to learn while we are young.
Two: New tricks are hard to teach.
Three: Dogs do not learn tricks easily." (Pause 5 seconds.)

"Question R: What does pity mean? — pity.

One: To feel sorry for some one.
Two: To hate some one.
Three: To give a beggar food." (Pause 5 seconds.)

"Question S: There is a saying that a stitch in time saves nine. It means,

One: It will save nine dollars.
Two: It is better to mend small tears before they get bigger.

Three: Be careful not to tear your clothes." (Pause 5 seconds.)

" Question T: There is a saying: ' Don't cry over spilt milk.' It means,

One: Crying does not bring back the milk.

Two: It is foolish to worry over things we can't help.

Three: The tears might fall in the milk." (Pause 5 seconds.)

" Now lay your pencils down and turn your booklets over to the first page." Have monitors collect the booklets.

III. DIRECTIONS FOR SCORING

General Plan

Each test consists of a certain number of items, defined below. Each item is answered either right or wrong; if right it counts one point, if wrong no points. There are no partial credits. Erasures and corrections are permitted in all tests but Test 4. The number of items in the eight tests are respectively 16, 12, 12, 10, 7, 8, 10, 10, making a total possible score of 85 points.

The correct answers to the items of Tests 1, 3, 5, 6, 7, and 8 are shown in the back of the Manual (pages 10 to 12). The correctness of items of Tests 2 and 4 are self-evident. It should be noted that the correct answers in Tests 6, 7, and 8 appear in a regular manner which renders the use of stencils unnecessary and aids in quickly detecting incorrect answers. It is suggested that each correct item be indicated by a check mark ($\surd$) or each incorrect item by a cross ($\times$), or that both checks and crosses be used. The score in each test (number of items answered correctly) is to be placed on the dotted line in the lower corner of the page. These will be copied afterward on to the front page of the booklet or on to the Class Record. The sum of the test scores constitutes the Total Score — the measure of the pupil's Mental Ability.

Special Directions

Test 1. There are 16 items, corresponding respectively to the 16 directions given for the test. Score each according to the *apparent intent* of the pupil, disregarding crudeness of drawing.

Item 1. In this item, for example, anything resembling a tail attached to the proper drawing of a cat will count as correct.

Items 3 *to* 8. It may happen that in addition to the correct symbol under some drawing, the pupil has placed another and incorrect symbol. This latter should be disregarded and if otherwise correct the item should be counted right. Thus, in Form A, if a circle has been placed under the teddy bear, which is correct, and also a cross, which is incorrect, the item will count as correct.

Items 10 *and* 11. If more than one chick or hand is crossed out, the item counts as wrong.

Items 12 *and* 13. If in either item more than the two correct drawings are crossed out or dotted, the item counts as wrong.

Items 14 *and* 15. The symbols must be wholly within the correct spaces, and there must be no other marks in the drawings.

Test 2. In the first row the first two drawings count as one item, the second two as one item, etc., making four items in the first row. In each succeeding row the first four drawings count as one item and the second four as one item, making two items in each row after the first. Each correct item counts one point. Maximum score, 12 points.

Note carefully if the proper symbols have been placed under the drawings in the first two rows. If so, all succeeding symbols may be counted as correct without inspection; [1] if not, succeeding rows must be inspected and are credited only where found correct. Incomplete or only partially correct items count nothing.

Test 3. Each drawing properly completed counts one point. Maximum score, 12 points. No partial credits are given. Inaccuracy of drawing is not considered, only the evident intention. If the right answer is given to any item, together with something else that is reasonably lacking, count the item as correct — as, for example, in Form A, if pupils are drawn in the eyes in Item 1, or the handle of the pistol is shaded. However, if too much is drawn in, the item counts as wrong — as, for example, in Form A, if other circles in Item 8 besides the central one are completed, or if more than one square in the checkerboard is blacked.

Test 4. Each square through which the line is successfully drawn counts one point, — that is, without crossing a line or entering a wrong passage, — provided, however, that slight cutting of corners, etc., apparently only through awkwardness, do not count off.

Test 5. Each line of drawings correctly answered counts one point. Maximum score, 7 points. Count off one point from the score if the figures are not placed in the small squares as directed.

Test 6. Each line of drawings correctly answered counts one point. Maximum score, 8 points. If two or more answers are given to any item, count that item wrong.

Tests 7 and 8. Each item counts one point. Maximum score in each test, 10 points. If more than one answer is given to any item, count that item wrong.

In scoring Tests 6, 7, and 8, the scorer should note the regular appearance of the correct answers. This may be committed to memory in a few moments, after which no reference is needed to the Table of Answers.

Recording Scores

For convenience in recording scores a Class Record is furnished in each package of test booklets. The copying of the scores in the separate tests on to the Class Record is optional.

IV. DETERMINATION OF NORMS

The median or middle score of unselected children of a given age is called the normal score or *norm* for that age. The norms for the Primary Examination for ages 5 to 15 are shown in Table 4.

[1] It has been found that when the first two rows are correct, it almost never happens that errors are made thereafter. If it should be noted incidentally that there are errors in succeeding rows, credit should be deducted accordingly.

TABLE 1

SHOWING THE DISTRIBUTIONS OF SCORES OF PUPILS OF GRADES ONE TO FIVE, ALL AGES COMBINED

(*Primary Examination*)

Score / Grade	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	Totals
1	44	49	54	53	40	28	23	20	14	5		1						331
2	4	8	22	45	67	90	68	87	86	55	37	23	11	3	3	1		610
3	1	0	1	5	7	24	43	64	93	106	106	101	69	32	16	5		673
4					2	11	11	27	50	74	87	103	90	73	44	17	2	591
5											3	10	19	26	38	19	5	120

The table of norms is based upon the scores of 2325 pupils throughout the country. The pupils whose scores were received were distributed in the grades as shown in Table 2. Their scores were distributed as shown in Table 1.

The norms for the Primary Examination, given in Table 4, were derived from the 2325 scores referred to in Table 2 by the process of augmenting the number of cases for each grade

TABLE 2

SHOWING THE DISTRIBUTION BY GRADES OF PUPILS TAKING THE PRIMARY EXAMINATION

Grade	Number of Pupils
1	331
2	610
3	673
4	591
5	120

to accord with the ratios of pupils actually in Grades 1, 2, 3, 4, and 5 (Bonner: Bulletin No. 24, 1920, Bureau of Education, page 91). The procedure for this correction is explained fully in the Manual of Directions for the Advanced Examination, page 7.

It will be noted that the norms in Table 4 run up to 100, whereas the maximum score in the test is 85 points. This simply means that if the test had been extended so as to be capable of adequately testing normal 15-year children, the

TABLE 3

REPRESENTATIVE PERCENTILE SCORES

Grade	Percentile Scores		
	25%	50%	75%
1	9	17	27
2	25	35	45
3	42	50	57
4	48	57	64
5	65	71	75

norm in the test for a child of 15 years 11 months would probably be about 100 points. These high norms are to be used just as are the lower ones for finding IQ's, etc. (See page 9.)

MENTAL AGE

The term Mental Age has arisen in connection with the Binet-Simon Tests. To say that a pupil has a mental age of 8 years means that he has the mental ability of a normal 8-year child. In general, then, the mental age of a pupil is the age of the normal child having his degree of mental ability.

There are, however, degrees of mental ability attained by bright individuals at or nearing maturity which are above that normal for any age, just as some individuals attain heights above the median of adults. In order to express those degrees of mental ability in terms of "mental age," the mental age scale has been extended artificially in the upper ranges for use with the Binet-Simon Tests. For a more complete explana-

TABLE 4

NORMS FOR PRIMARY EXAMINATION (Revised November, 1925)

Years	5	6	7	8	9	10	11	12	13	14	15
Months											
0 . .	0	10	22	35	47	60	71	77	83	89	95
1 . .	0	11	23	36	48	61	71	77	83	89	95
2 . .	0	12	24	37	49	62	72	78	84	90	96
3 . .	1	13	25	38	50	63	72	78	84	90	96
4 . .	2	14	26	39	51	64	73	79	85	91	97
5 . .	3	15	27	40	52	65	73	79	85	91	97
6 . .	4	16	28	41	54	66	74	80	86	92	98
7 . .	5	17	30	42	55	67	74	80	86	92	98
8 . .	6	18	31	43	56	68	75	81	87	93	99
9 . .	7	19	32	44	57	69	75	81	87	93	99
10 . .	8	20	33	45	58	69	76	82	88	94	100
11 . .	9	21	34	46	59	70	76	82	88	94	100

tion of this point see Chapter XIII of *Statistical Method in Educational Measurement*, by Arthur S. Otis, published by World Book Company.

To find the Binet Mental Age of a pupil from his score in the Primary Examination, consult Table 5, on page 8.

A mental age obtained from this table is the most probable Binet Mental Age that corresponds to the given score on the Primary Examination. For some as yet unexplained reason, for pupils of a given chronological age the variability of the distribution of their mental ages obtained from a group test tends to be greater than the variability of such a distribution obtained from the Binet test. That is, for a dull pupil the mental age obtained from Table 5 will tend to be too low and for a bright pupil it will tend to be too high. Therefore IQ's should not be computed from this table, but from Table 6 (page 9).

V. INTERPRETATION OF RESULTS

Intelligence and Brightness

There are two aspects of the mind of a child that must not be confused. One is his degree of *mental ability* and the other is his degree of *brightness*.

Mental ability is that growing ability in a child which enables him, year by year, to think more abstractly and solve more difficult problems. Growth in mental ability may be thought of as growth in thinking power.

Brightness is that fixed quality of mind which determines the rate at which a child's thinking power shall grow. It is differences in brightness that cause children of the same age to differ in mental ability and that enable some individuals to reach ultimately a higher level of intellectual power than others.

Mental ability is measured in terms of score in a mental ability test, while brightness is measured by the so-called Intelligence Quotient (see page 9). These are derived measures and are obtained only by consideration of a pupil's score or mental age in the light of the score or mental age that is normal for the age of the pupil in question.

TABLE 5

The Binet Mental Age Corresponding to Each Score in the Primary Examination

Score	M A	Score	M A	Score	M A	Score	M A	Score	M A	Score	M A
1	5 : 3	16	6 : 6	31	7 : 8	46	8 : 11	61	10 : 1	76	11 : 11
2	5 : 4	17	6 : 7	32	7 : 9	47	9 : 0	62	10 : 2	77	12 : 1
3	5 : 5	18	6 : 8	33	7 : 10	48	9 : 1	63	10 : 3	78	12 : 3
4	5 : 6	19	6 : 9	34	7 : 11	49	9 : 2	64	10 : 4	79	12 : 5
5	5 : 7	20	6 : 10	35	8 : 0	50	9 : 3	65	10 : 5	80	12 : 7
6	5 : 8	21	6 : 11	36	8 : 1	51	9 : 4	66	10 : 6	81	12 : 9
7	5 : 9	22	7 : 0	37	8 : 2	52	9 : 5	67	10 : 7	82	12 : 11
8	5 : 10	23	7 : 1	38	8 : 3	53	9 : 6	68	10 : 8	83	13 : 1
9	5 : 11	24	7 : 2	39	8 : 4	54	9 : 6	69	10 : 10	84	13 : 3
10	5 : 0	25	7 : 3	40	8 : 5	55	9 : 7	70	10 : 11	85	13 : 5
11	6 : 1	26	7 : 4	41	8 : 6	56	9 : 8	71	11 : 1		
12	6 : 2	27	7 : 5	42	8 : 7	57	9 : 9	72	11 : 3		
13	6 : 3	28	7 : 6	43	8 : 8	58	9 : 10	73	11 : 5		
14	6 : 4	29	7 : 7	44	8 : 9	59	9 : 11	74	11 : 7		
15	6 : 5	30	7 : 7	45	8 : 10	60	10 : 0	75	11 : 9		

The term Intelligence unfortunately has been used by nearly all writers both as meaning mental ability and as meaning brightness, and much confusion of thought has arisen on account of this double usage. Pending the standardization of the definition of the word Intelligence, it has seemed best to avoid its use when necessary to distinguish between mental ability and brightness.

The hypothetical individual of exactly normal or average brightness progresses in mental growth in such a manner that at each year of age he attains a score just equal to the median or middle score of children of that age. The above hypothetical individual of exactly normal brightness, if tested at the age of 8 years, would make a score in the Primary Examination of 35 points; if tested at the age of 9 years, his score would be 47 points, etc. His progress in terms of score is approximately uniform until the age of about 11 years, when the yearly increments of growth in terms of score decrease until the age of 15 years. According to the norms for the Advanced Examination, growth apparently continues until the age of 18 years, beyond which apparently no further growth takes place. At 18 years of age an individual's natural mental ability is fully developed. Thereafter he merely acquires knowledge, experience, wisdom, and so on.

Of several hundred pupils taken at random from the school population of the country, whose " age last birthday " was 7 years and whose average age therefore was 7 years and 6 months, the median score in the Primary Examination was 28 points. We should expect the hypothetical child of exactly normal brightness, therefore, at the age of 7 years and 6 months to attain a score of 28 points. We find, however, that the actual scores of these pupils range from almost zero to nearly 80, as shown in Table 7 (page 10).

This wide range of scores of a group of pupils of the same age is due to the fact that certain children have an innate capacity for greater mental achievement than others, which operates to give them, chiefly during the early years of their mental development, an advance over their less fortunate fellows. This innate capacity we have called *Brightness*. That is, the greater the capacity for mental development, or the greater the potential development, the greater the degree of brightness. A child who exceeds just one half of the children of his age in mental ability and whose score is therefore just equal to the norm for that age is considered just *normal*. If a pupil obtains a score which is 25 points above the norm for his age, we may say that he has an *Increment of Score* of 25 points; if his score falls short of the norm by 15 points, we may say that he has a *Decrement of Score* of 15 points. Either the Increment of Score or the Decrement of Score is a *Deviation from the Norm*. Those who exceed more than half of the children of their own age and who consequently have an Increment of Score are therefore brighter than normal, and those who exceed less than half and have a Decrement of Score are duller than normal. Broadly speaking, however, the term " normal " is used to characterize all those who fall within the middle half of the group as distributed on the scale of brightness. Usually only those who fall in the upper quarter are termed bright and only those who fall in the lower quarter are termed dull.

Percentile Rank

A pupil who exceeds just 50 per cent of the children of his age in Intelligence is said to have a *Percentile Rank* (PR) of 50. One who exceeds just 75 per cent of the children of his age in Intelligence is said to have a Percentile Rank of 75, etc. It may be seen, therefore, that the range of Percentile Ranks is from 0 to 100. A PR of 50 means exact normality, etc.

Now it is accepted as a fundamental fact that in most cases a child who is above normal at one age will be above normal at all ages, and a child who is below normal will always be below normal. Moreover, the degree of brightness of an individual is expected to remain approximately constant. Were this not so, prognostication would be impossible. Intelligence measurement would be of little value.[1]

This means that if an 8-year child exceeds just 50 per cent of 8-year-olds in mental ability, — being therefore a normal

[1] Exceptions to this rule are noted in certain special instances, particularly in the case of feeble-minded persons.

child, — he will be expected to exceed approximately 50 per cent of children of his age at any later time and hence, when an adult, to exceed 50 per cent of adults in mental ability. That is, he maintains a constant Percentile Rank of 50. Similarly, an 8-year child who exceeds 75 per cent of 8-year-olds in mental ability will be expected to exceed 75 per cent of children of his age at any later time and hence ultimately to exceed in mental ability 75 per cent of adults, etc. That is, an individual's Percentile Rank is assumed to remain approximately constant. The Percentile Rank of an individual, therefore, is another measure of his degree of brightness. (See Table 6 for the percentile rank corresponding to each intelligence quotient.)

Directions for Finding an IQ

In view of the desire on the part of a number of examiners to express the measures of brightness of their pupils in terms of Intelligence Quotient, Table 6 is provided.

The " IQ " of a pupil found from this table is not the same as would be obtained by dividing his mental age obtained from Table 4 by his chronological age, but is, nevertheless, more nearly equal to the IQ that would be obtained from the Binet-Simon Tests than an IQ found as above.

To find the IQ of a pupil, find the difference between his score and the norm for his age. (Norms are given in Table 4.) Call this difference the " Deviation of Score " (DS). Find the IQ corresponding to this Deviation of Score in Table 6.

The table is read as follows: If a pupil made a score 0 points higher or lower than the norm for his age, his IQ is 100 and he exceeds 50 per cent of pupils of his age in mental ability. If his score is 1 point above the norm for his age, his IQ is 101 and he exceeds 53 per cent of pupils of his age in mental ability. If his score is 1 point below the norm for his age, his IQ is 99 and he exceeds 47 per cent of pupils of his age in mental ability, etc.

TABLE 6 [1]

For Finding the Binet IQ by the Advanced Examination

Deviation of Score	Plus Deviation		Minus Deviation	
	IQ	PR	IQ	PR
0	100	50	100	50
1	101	53	99	47
2	102	57	98	43
3	103	60	97	40
4 5	104	63	96	37
6	105	66	95	34
7	106	69	94	31
8	107	72	93	28
9-10	108	75	92	25
11	109	77.5	91	22.5
12	110	80	90	20
13	111	82	89	18
14–15	112	84	88	16
16	113	86	87	14
17	114	88	86	12
18	115	89	85	11
19 20	116	91.1	84	8.9
21	117	92.4	83	7.6
22	118	93.55	82	6.45
23	119	94.4	81	5.6
24 25	120	95.4	80	4.6
26	121	96.1	79	3.9
27	122	96.8	78	3.2
28	123	97.3	77	2.7
29 30	124	97.8	76	2.2
31	125	98.2	75	1.8
32	126	98.58	74	1.42
33	127	98.84	73	1.16
34–35	128	99.09	72	.91
36	129	99.27	71	.73
37	130	99.43	70	.57
38	131	99.54	69	.46
39–40	132	99.65	68	.35
41	133	99.72	67	.28
42	134	99.79	66	.21
43	135	99.84	65	.16
44–45	136	99.88	64	.12
46	137	99.90	63	.10
47	138	99.93	62	.07
48	139	99.95	61	.05
49	140	99.96	60	.04

VI. USES OF INTELLIGENCE TESTS

A comprehensive presentation of the uses of intelligence tests will be found in Dickson's *Mental Tests and the Classroom Teacher* (World Book Company). Some of these purposes are enumerated here.

Classification. The pupils in any class or school fall into three general types: (1) the average pupils, to whom the work and organization of the school are best fitted and who do fairly well; (2) the dull, who are slow in learning and have difficulty in understanding, and who are usually pushed ahead in the grades because of size or age; and (3) the bright, who learn quickly and easily and much of whose time during the day is, for that reason, necessarily unoccupied by school work.

In general the dull pupil is dull in all his work, the bright pupil is uniformly bright, and the average is uniformly average, although marked exceptions to this rule do appear. The work of the schools will then be most effective if it is determined in which of the three groups each pupil falls and if the work is adapted to the abilities of the pupils in each group. The duller pupils must be expected to learn more slowly and to require more simple and thorough presentation. The bright pupils learn so quickly that an enriched curriculum must be provided for them so that all their time in school will be occupied with activities of educational value to them. It is to these exceptional children that the nation must look for the creative genius and leadership by means of which society can evolve a greater civilization.

Perhaps the chief value of intelligence measurement, then, is the scientific (as well as rapid and accurate) classification of pupils in regard to their native capacities to learn, in order

[1] Dr. L. M. Terman, author of the Stanford Revision of the Binet-Simon Intelligence Scale, has stated that the semi-interquartile range of the distribution of IQ's obtained by this test is 8 points (*The Measurement of Intelligence*, pages 78 ff., Houghton Mifflin Company, 1916). That is, a pupil who exceeds 75 per cent of pupils of his age in mental ability obtains an IQ of 108. Therefore, Table 6 has been constructed so that any pupil whose score exceeds the scores of 75 per cent of pupils of his age will obtain an IQ of 108. Consequently, of course, the percentile rank corresponding to the IQ of 108 is necessarily 75. The other IQ's and percentile ranks in the table were worked out on this basis.

TABLE 7

SHOWING THE DISTRIBUTIONS OF SCORES IN THE PRIMARY EXAMINATION FOR AGE GROUPS SIX TO TWELVE. BASED ON 2325 CASES. DISTRIBUTIONS AUGMENTED

AGES	SCORES																	TOTALS
	0 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 TO 29	30 TO 34	35 TO 39	40 TO 44	45 TO 49	50 TO 54	55 TO 59	60 TO 64	65 TO 69	70 TO 74	75 TO 79	80 TO 84	
5 : 0 to 5 : 11	6	8	4	2			2											
6 : 0 to 6 : 11	59	65	70	62	56	43	29	23	11	8	1	1						428
7 : 0 to 7 : 11	21	27	31	62	50	58	50	43	65	36	22	15	15	3	2	1		501
8 : 0 to 8 : 11	2	9	19	23	22	48	34	55	69	69	70	59	31	17	7	3		537
9 : 0 to 9 : 11	2	1	2	9	13	22	26	41	53	48	67	95	71	42	38	7	5	542
10 : 0 to 10 : 11	2		2	3	4	8	15	22	34	45	44	57	89	62	102	56	1	546
11 : 0 to 11 : 11	0	1	2	1	4	3	8	13	12	17	18	25	17	58	54	23	6	262
12 : 0 to 12 : 11	1			2	1	3	2	8	8	12	16	11	32	49	28	17	15	205

to provide for the separate teaching of pupils who differ markedly in ability to progress in school.

Feeble-minded and gifted. At one extreme there are found pupils in schools who are not able to profit from school work in the usual school organization. The more serious cases should be placed in institutions for the feeble-minded. The less serious cases should be placed in special classes.

At the other extreme there are found the exceptionally brilliant pupils who are not challenged to an appreciable degree by the usual school work. They too should be segregated, so that they will be in classes with pupils like themselves and provided with a specially enriched curriculum that will develop to the greatest possible extent their superior mental abilities and their possibilities for social and physical development.

Vocational guidance. Intelligence tests can be used to determine roughly the level of the vocation that a pupil may safely strive to prepare for. For example, it is known that for success in the professions — medicine, law, engineering, etc. — a high degree of general ability is required. On the other hand, for unskilled labor a fairly low level of general ability ordinarily suffices. For more precise guidance special tests, aptitude tests, must be used. Whether a particular boy or girl should prepare for one vocation or another depends on his tastes and temperament, his previous experience, his special aptitudes as a result of the foregoing, his financial resources, immediate opportunities, etc. When these and his intelligence rating are known, vocational guidance becomes not a matter of measurement, but of judgment.

Problem pupils. Much light can be thrown on the reason for delinquency or other types of problems existing among school children, by their intelligence ratings. For this purpose the services of a trained psychologist must be obtained. Many school systems employ psychologists and visiting teachers to study and correct problem cases. The intelligence test is an important part of their technique.

Intelligence tests can also be used to advantage in penal institutions and in criminal cases, since among criminals a much larger percentage are feeble-minded than the percentage of feeble-minded in the population at large. Such tests will help in understanding the criminal better and in making more just and suitable the punishment or correction to be applied.

Validity of the Otis Group Intelligence Scale. For a discussion of the validity of the test as a measure of that which we have called general mental ability, the reader is referred to Otis, Arthur S., "An Absolute Point Scale for the Measurement of Intelligence," *Journal of Educational Psychology*, May and June, 1918, and Terman, L. M., *The Measurement of Intelligence* (Houghton Mifflin Company, Boston, Massachusetts).

KEY FOR SCORING

ANSWERS, PRIMARY EXAMINATION (*Forms A and B*)

Item	TEST 5	6	7	8
1	2–1–3	3	O	2
2	2–3–1	2	S	2
3	1–3–2	1	S	3
4	2–1–4–3	2	O	3
5	3–1–2–4	3	O	2
6	3–1–5–4–2	4	S	2
7	1–3–5–2–4	5	S	1
8		4	O	1
9		3	O	2
10			S	2

(*Key continued on pages 11 and 12*)

PLATE I

ANSWERS, PRIMARY EXAMINATION, TEST 1 (*Form A*)

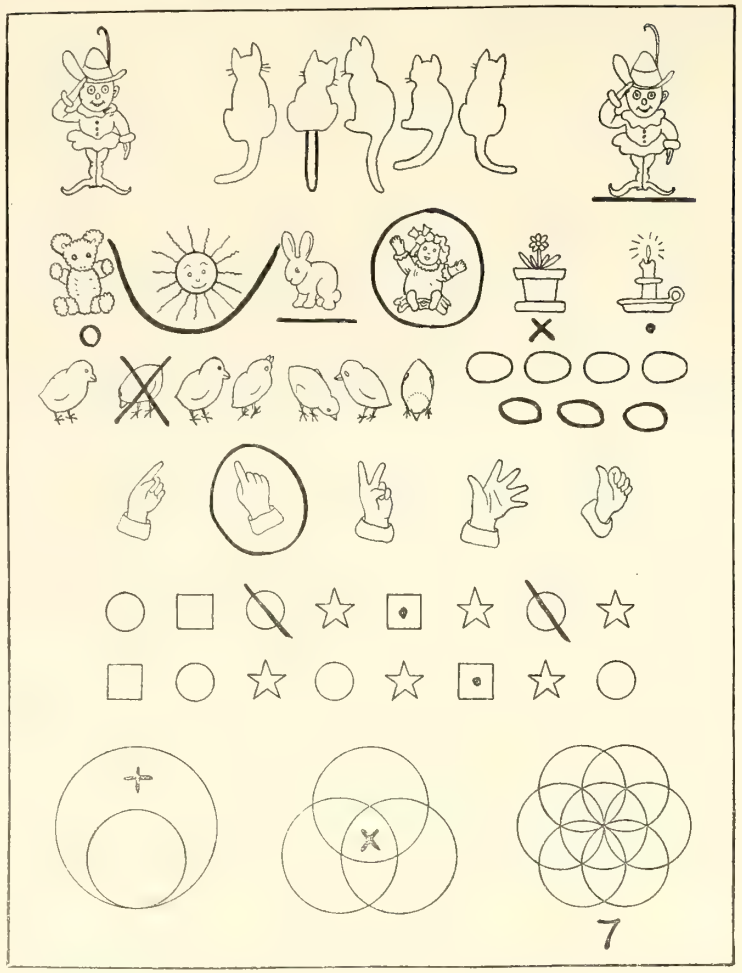
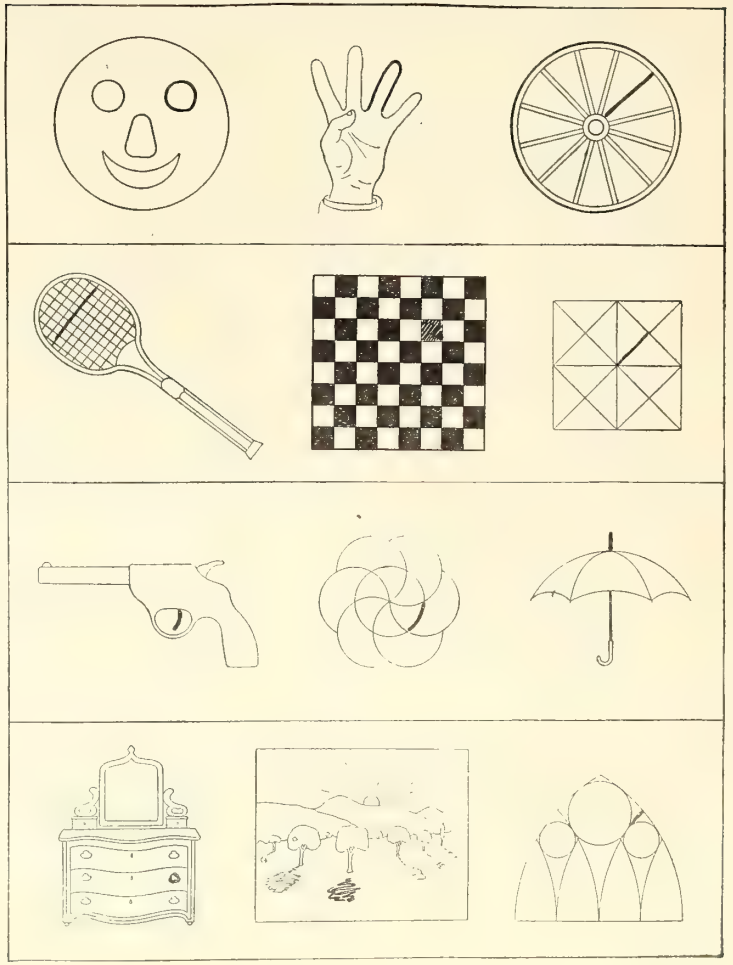


PLATE II

ANSWERS, PRIMARY EXAMINATION, TEST 3 (*Form A*)



KEY FOR SCORING — *Continued*

PLATE III

ANSWERS, PRIMARY EXAMINATION, TEST 1 (*Form B*)

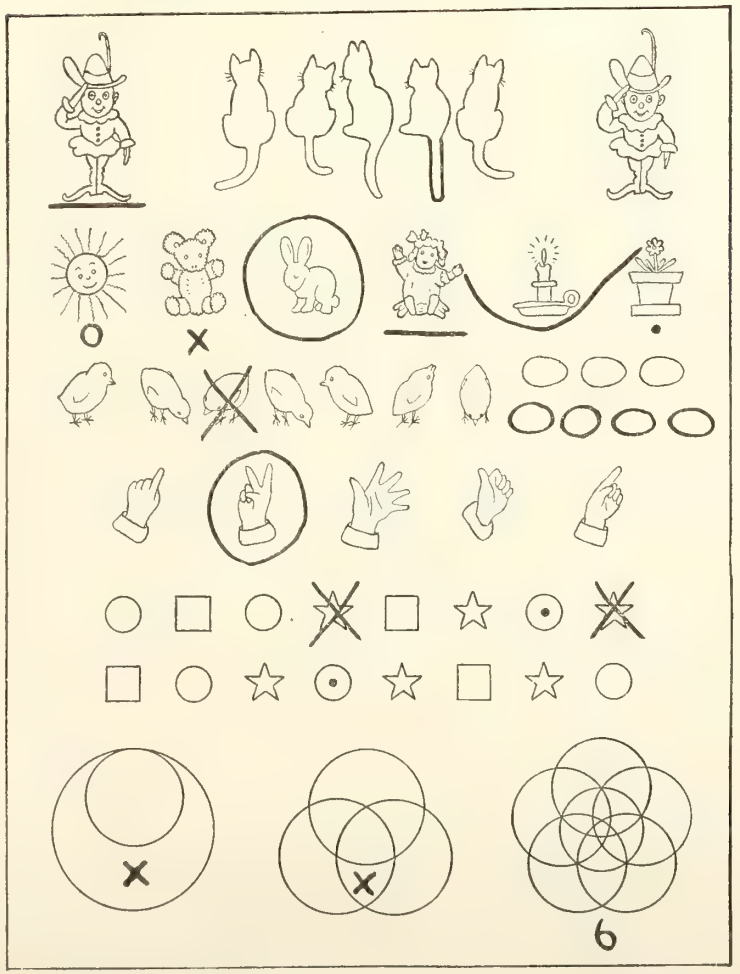
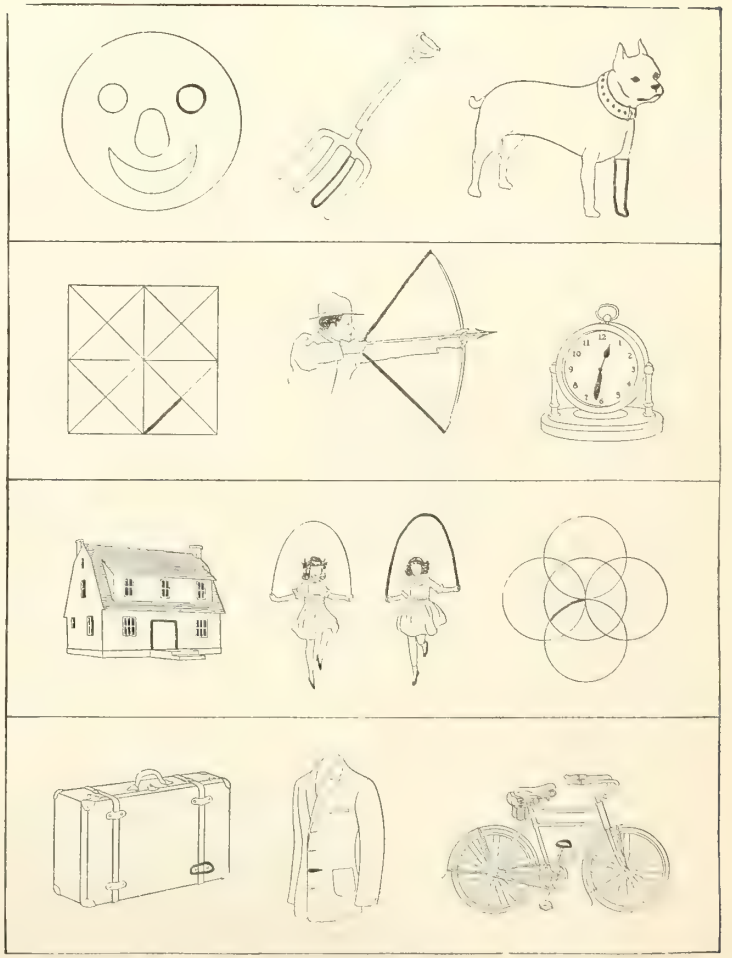


PLATE IV

ANSWERS, PRIMARY EXAMINATION, TEST 3 (*Form 3*)



DETROIT ADVANCED FIRST-GRADE INTELLIGENCE TEST

By Harry J. Baker

Clinical Psychologist, Detroit Public Schools, Detroit, Michigan

TEST: FORM A

Name .....
(First name, initial and last name)

Age last birthday .....years, ...months. Grade ..... Class .....

Teacher ..... Examiner .....

School .....

City ..... Date .....19.....

TEST	SCORE
1	
2	
3	
4	
5	
6	
7	
Total	

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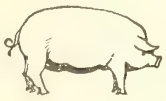
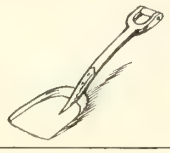
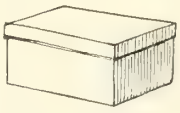
A

1

2

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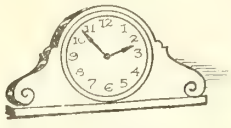

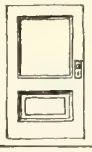

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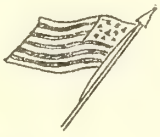

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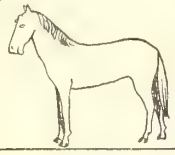

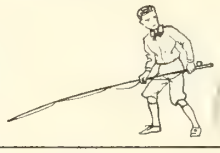

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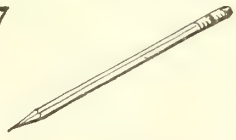
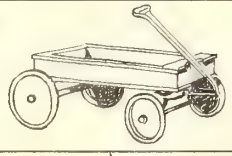

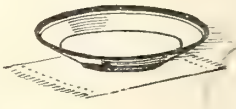

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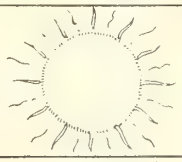

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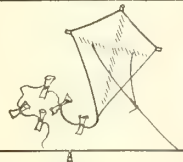
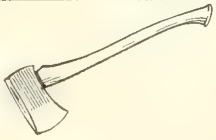

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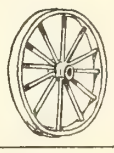
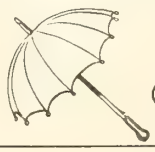

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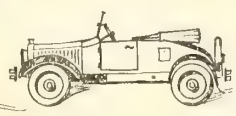
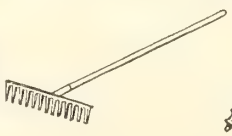

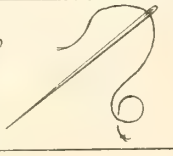

Number of rows right _____ *(Score)*

A

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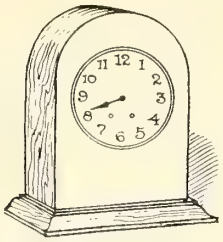

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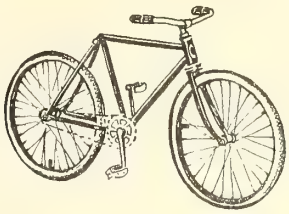

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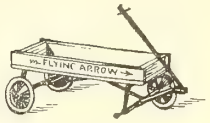

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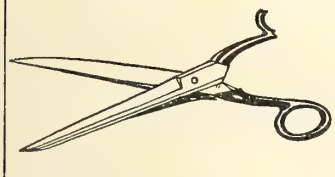

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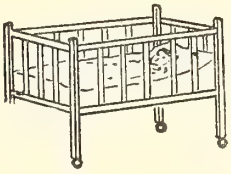

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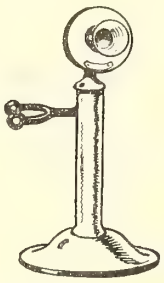

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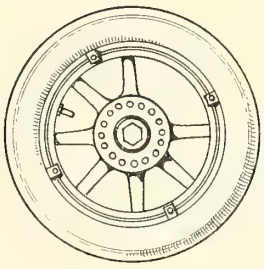

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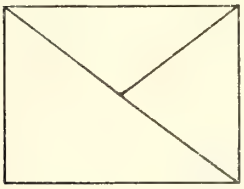

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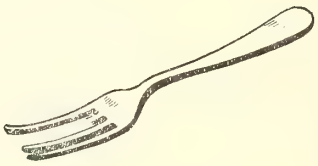

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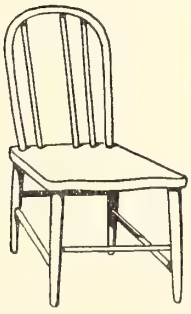

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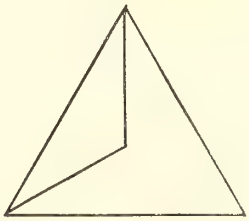

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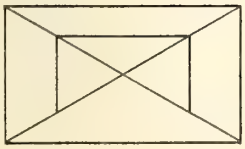

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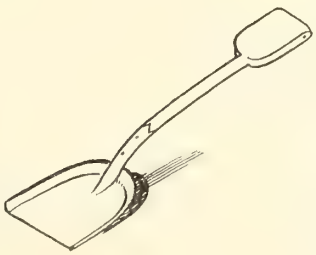

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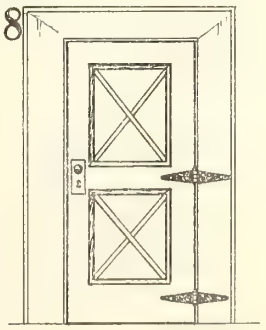

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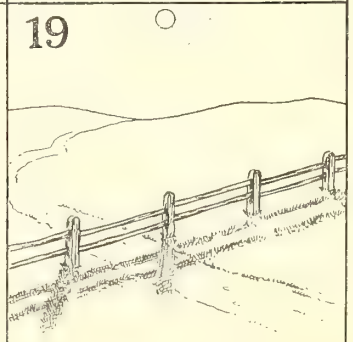

Number right _____ *(Score)*

3

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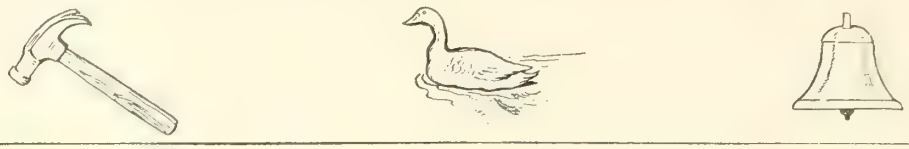
1 

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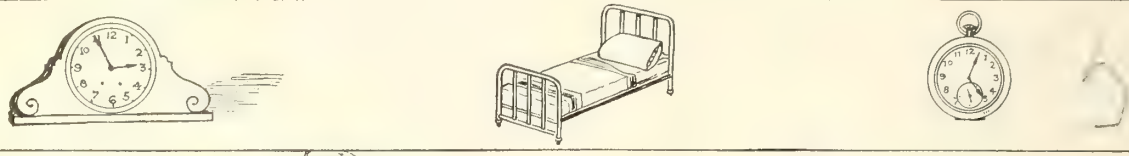
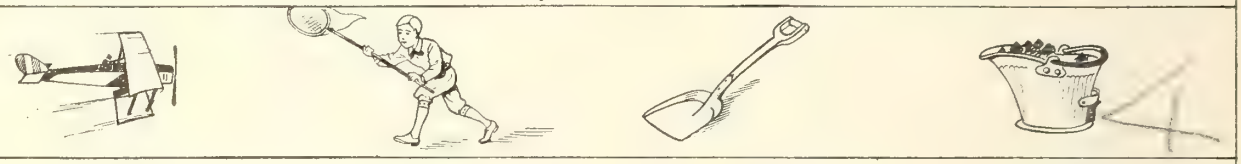
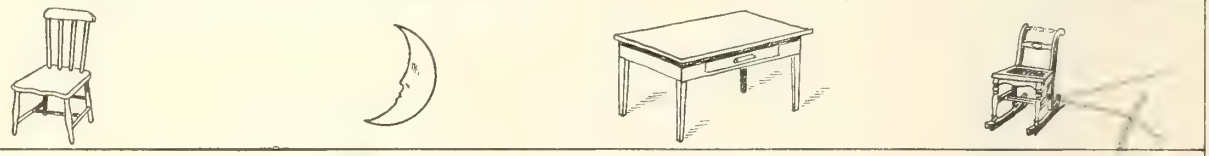
3 

4 

5 

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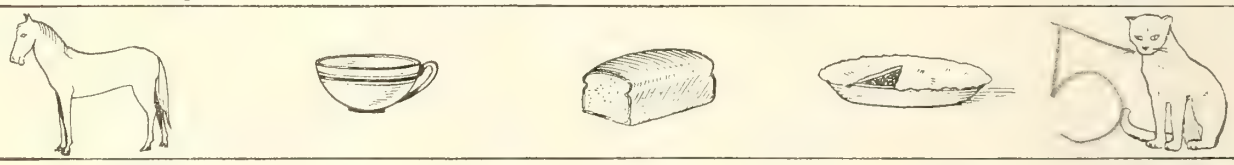
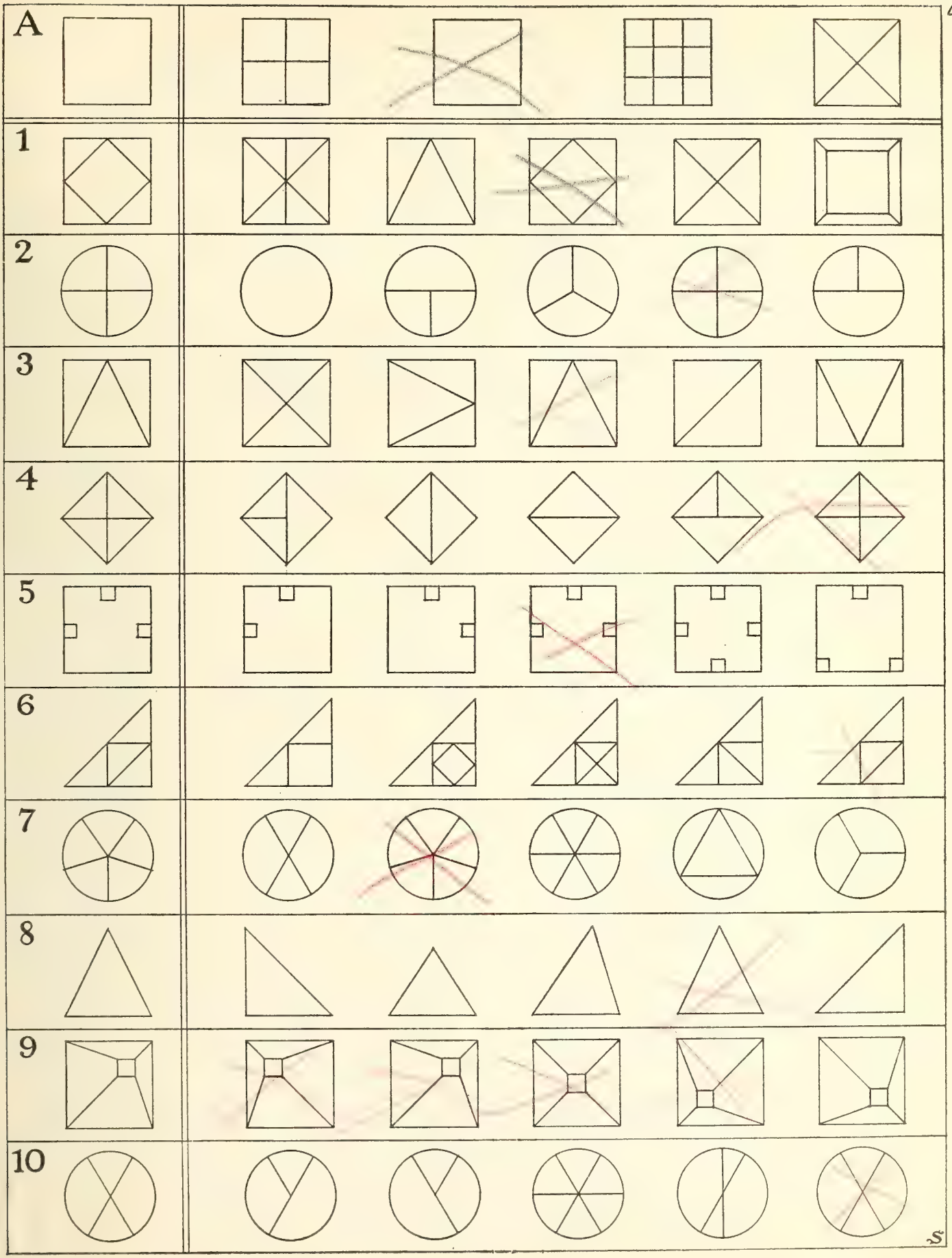
8 

9

10

11

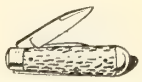
Number of rows right _____ *(Score)*



Number of rows right _____ (*Score*)

5

A



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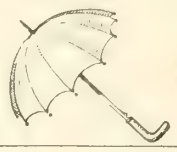

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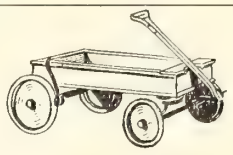
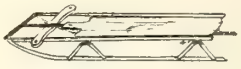
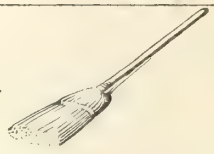

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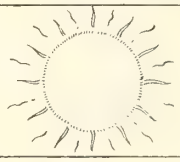

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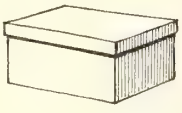

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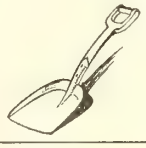
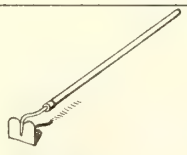

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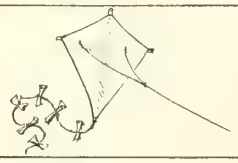

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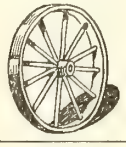
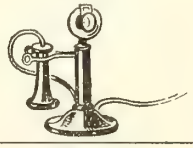

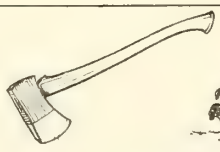

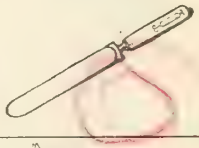

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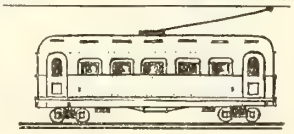

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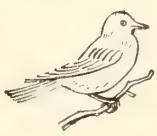
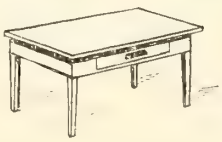

Number of rows right _____ *(Score)*

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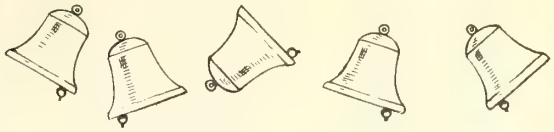

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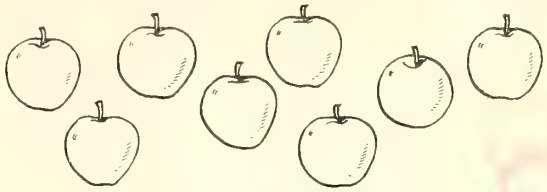

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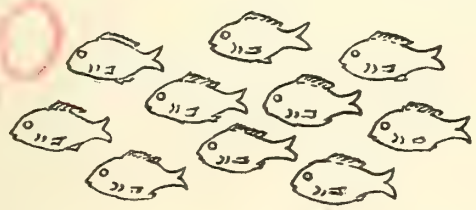

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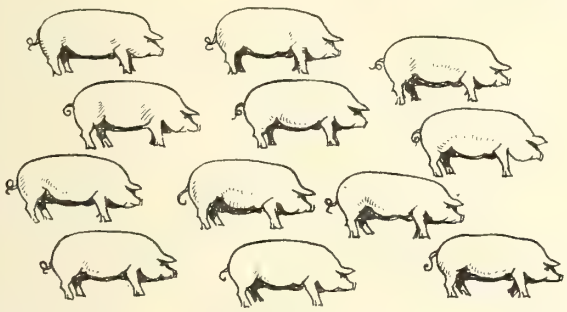

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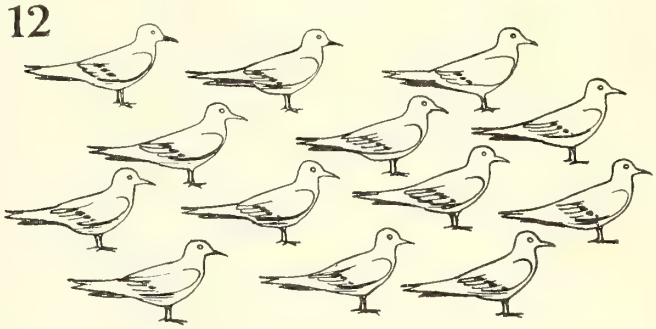

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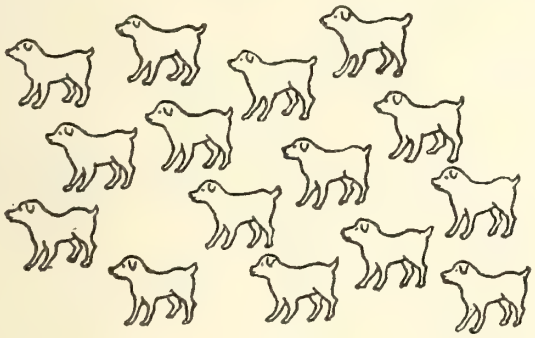

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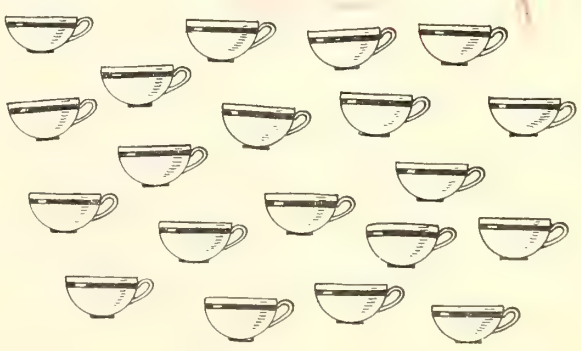

Number right _____ (Score)

7

Number of rows right _____ *(Score)*

DETROIT ADVANCED FIRST-GRADE INTELLIGENCE TEST

By Harry J. Baker

Clinical Psychologist, Detroit Public Schools, Detroit, Michigan

MANUAL OF DIRECTIONS AND KEY

The Detroit Advanced First-Grade Intelligence Test was designed to furnish a mental examination for pupils in Detroit who were too far advanced to take the regular Detroit (Beginning) First-Grade Intelligence Test, and also to test pupils for whom the Detroit intelligence test which is used in grades above the first proved too difficult. It is used in the low first grade on pupils who are still unclassified after two months of the semester have elapsed. It is used for unclassified pupils in the high first grade, and also in the early months of the low second grade. It is not used above this point regularly, although norms and letter ratings have been derived to classify over-age pupils who may be found in the grades in which the test is regularly used.

Nature of the Test

The test is entirely pictorial, and hence does not make any demands upon reading ability. It is not non-linguistic, and while the verbal directions are very important they are stated in simple terms.

Test 1 is primarily a test of memory. There are eleven sets of pictures after the sample item. The pupil is instructed to mark the items after the examiner has pronounced them. In the first set of pictures two items are to be marked, and in the final set seven items are to be marked.

Test 2 is a missing-parts test. The items are arranged in order of difficulty. There is one sample. The first three items of the test are marked without any discussion, and ten seconds are allowed for each item. After that point a general time limit of three minutes covers the rest of the page. Pupils of this age are apparently just beginning to understand the importance of a time limit, and before this time they do not observe it unless under very special stimulation.

Test 3 is similar to Test 1 in general plan, but adds an information element to that of memory. The objects are described instead of being named directly. There are eleven sets of items, and these are arranged in order of difficulty.

Test 4 consists of marking one of five designs which is exactly like the stimulus design found at the beginning of the row. There are ten sets of designs, and after the first row a time limit of two minutes is used.

Test 5 is similar in general technique to Test 1 and Test 3, in that it requires a memory element. In this test the pupils are asked to mark parts of objects, which are defined by the examiner chiefly in terms of use, such as "the part of the pencil that writes." There are eleven sets of items, each with its own special instructions and time limit.

Test 6 involves counting up to eighteen objects on the most difficult item, and also the ability to read numbers to eighteen. Sets of pictures of common objects are shown, together with a numeral with each group, such as six apples. This feature is the only place in the entire test where acquired school training is called into play, and many pupils have a considerable mastery of number before school entrance.

Test 7 involves general information and also the ability to determine a classification of objects. Four chairs and a table are shown in a set of pictures, and the pupil is to mark the chairs and omit marking the table. Eleven sets of items are included, and two minutes are allowed for marking.

The entire test takes between thirty and thirty-five minutes.

Standardization of the Test

This test was tried out in mimeographed form on about five hundred pupils. The material in each test was arranged in an approximate order of difficulty, and arranged in actual order of difficulty in the printed edition as determined by the preliminary edition.

The preliminary edition was scored and divided into three groups as follows: (1) the one hundred highest total scores; (2) the one hundred lowest total scores; and (3) one hundred cases immediately about the median score. The percentage of difficulty was determined for each item of each sub-part of the test, for each of the three groups mentioned above. No item was retained in the final edition which did not clearly differentiate between these three groups. For example, Item 5 of Test 1 is passed by 94%, 77%, and 43%, respectively, of the bright, average, and dull groups. Item 16 of Test 2 is passed by 51%, 29%, and 11%, respectively.

Reliability of the Test

There is only one form of this test, and therefore coefficients of reliability could not be determined. The test was repeated on 158 unselected pupils after an interval of two weeks, and the correlation (Pearson r) between scores on the first and second testing was .943 (P.E. = .005). The improvement in median score was from 39 to 48 points. The intelligence letter ratings were also correlated for this group of pupils and found to be .902 (P.E. = .011).

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PRINTED IN U.S.A.

Forty-six unselected first-grade pupils were given the Stanford Binet individual test, and the correlation of mental age with score was .848 (P.E. = .027). On the same tests, in the case of 227 pupils who were tested on account of being mentally backward, the correlation was .573 (P.E. = .031).

Directions for Administering

To administer the test, have the blanks on the first page of the test booklets filled out in advance, giving each pupil's name, age last birthday in years and months, grade, class (as *X*, *Y*, or *Z*), etc. Have an extra copy of the test booklet at hand for use in showing the pupils how to turn the pages. Be sure to have also a watch having a second hand, for it is necessary to count seconds. Of course, if a stop watch is available, that will be the better.

Before passing out the booklets say: **"Now, boys and girls, we have some little books with nice pictures in them, and we are going to play some games with these books. I am sure you will like them very much. We are now going to pass out the little books, but you must not open them until we tell you to."**

Have the booklets passed, seeing that each pupil gets the one bearing his name. Then say: **"Now listen very carefully while I tell you just what to do. Do not ask questions. We want to find out how well each one can do for himself. Some of the things will be very easy and some will be a little hard, but do the best you can. I will tell you what to do on each page. Now it is not fair for any pupil to look to see what some one else is doing. You must look only at me and at your own paper, and nowhere else.**

"Turn over one page and fold the book back like this." Show how by turning back the first page of one of the test booklets. Hold up the booklet so that all may see Test 1, and make sure that all have the right place. Then say:

TEST 1

"Now every one look at me. We are going to mark some of the pictures on this page. I will tell you just what pictures to mark, and then you mark the pictures. A mark means a big line on the picture, like this." (Draw a ball on the blackboard and make a heavy line through it.)

"Hold your pencils up. Now look at the very top row where you see A. Mark the ball and the shoe." Repeat these directions if necessary since this is only a sample, but do not repeat the directions for any of the other lines on the page. Allow **5** seconds for marking. Then say:

"Pencils up. Look at row No. 1; mark the pail and the cow. Mark." (Five seconds.)

"Pencils up. Look at row No. 2; mark the box and the shovel. Mark." (Five seconds.)

"Pencils up. Look at row No. 3; mark the clock, the fork, and the door. Mark." (Five seconds.)

"Pencils up. Look at row No. 4; mark the apple, the broom, and the knife. Mark." (Five seconds.)

"Pencils up. Look at row No. 5; mark the hairbrush, the bottle, the fish, and the chair. Mark." (Ten seconds.)

"Pencils up. Look at row No. 6; mark the horse, the bed, the leaf, and the moon. Mark." (Ten seconds.)

"Pencils up. Look at row No. 7; mark the pencil, the sheep, the wagon, the plate, and the man. Mark." (Ten seconds.)

"Pencils up. Look at row No. 8; mark the fence, the sun, the glass, the goat, and the girl. Mark." (Ten seconds.)

"Pencils up. Look at row No. 9; mark the house, the dog, the hammer, the kite, the elephant, and the barrel. Mark." (Fifteen seconds.)

"Pencils up. Look at row No. 10; mark the dish, the pumpkin, the thimble, the potato, the umbrella, and the wheel. Mark." (Fifteen seconds.)

"Pencils up. Look at row No. 11; mark the rake, the automobile, the tree, the screw, the telephone, the bicycle, and the needle. Mark." (Fifteen seconds.)

"Now turn over the book to page 2, like this." (Show.)

"See if you have a page that looks like this."

TEST 2

"The man who made these pictures forgot something; he left something out of every picture. Look at the very first picture of the man's head, at 'A.' What is gone from the man's head?" (Pause for reply.) **"Yes, the ear is not there. Take your pencil and make a mark to show where the ear ought to be. Fix an ear for him. Go ahead. You can do it very nicely."**

"Now we won't say it, but you look at the clock picture and mark the thing that is gone, the thing that is missing." (Ten seconds.) **"Now, fix the thing that is gone from the bicycle picture."** (Ten seconds.) **"Now fix the thing that is gone from the wagon picture."** (Ten seconds.)

"Now go ahead and fix every picture on the page. Keep right on and fix all of them. Ready — Go." (Allow three minutes from this point on, and occasionally stimulate the pupils by saying: **"That is right, keep right on, do as many as you can."**)

"Stop, turn over the page to page 3, and fold the book back like this." (Show how to turn the page and let the pupils see Test 3.)

TEST 3

"We are going to mark some of the pictures on this page. I will tell you just what pictures to mark, and then you will mark them."

"Hold your pencils up. Now look at the very top, at 'A.' Mark the thing that flies." (Repeat this item if necessary, but do not repeat on any other lines. Allow five seconds for marking.)

"Pencils up. Look at row No. 1; mark the thing that swims. Mark." (Five seconds.)

"Pencils up. Look at row No. 2; mark two things we eat with. Mark." (Five seconds.)

"Pencils up. Look at row No. 3; mark two things that tell what time it is. Mark." (Five seconds.)

"Pencils up. Look at row No. 4; mark the thing that flies, and the thing that burns. Mark." (Five seconds.)

"Pencils up. Look at row No. 5; mark the two things we sit on, and the thing that gives light. Mark." (Five seconds.)

"Pencils up. Look at row No. 6; mark the three things that have feathers. Mark." (Ten seconds.)

TABLE 1

LETTER RATINGS BASED ON 2975 CASES, JUNE, 1926

AGE	E 8%	D 12%	C − 18%	C 24%	C + 18%	B 12%	A 8%
5-6 to 5-11	0-4	5-11	12-19	20-29	30-40	41-49	50-83
6-0 to 6-5	0-9	10-17	18-26	27-37	38-48	49-58	59-83
6-6 to 6-11	0-14	15-23	24-33	34-44	45-55	56-64	65-83
7-0 to 7-5	0-19	20-29	30-40	41-51	52-60	61-68	69-83
7-6 to 7-11	0-23	24-34	35-45	46-57	58-65	66-72	73-83
8-0 to 8-5	0-27	28-40	41-51	52-62	63-70	71-76	77-83
8-6 to 8-11	0-33	34-45	46-56	57-65	66-72	73-78	79-83
9-0 to 9-5	0-40	41-52	53-61	62-70	71-76	77-80	81-83
9-6 to 9-11	0-49	50-60	61-68	69-73	74-79	80-83	
10-0 to 10-5	0-59	60-68	69-74	75-79	80-83		
10-6 to 10-11	0-69	70-75	76-79	80-83			
11-0 or older	0-75	76-79	80-83				

These ratings of A, B, C, etc., are measures of brightness. A pupil having a rating of A, which corresponds to a high IQ, will not obtain the greatest profit from taking the usual course of study at the regular rate. As far as possible, children rating A should probably have an enriched course of study which need not carry them through school faster than the usual rate. However, if the number of pupils is very small, so that enrichment cannot be provided, a moderate amount of extra promotion is probably desirable. In the case of dull pupils, rated D or E, the opposite situation is to be found. That is, these pupils cannot take the traditional course at the regular rate and adjustments are necessary for them. The best type of adjustment would be a minimum course based upon the regular course of study but suited to the more limited ability of such pupils. In the absence of such differentiation these pupils must necessarily be required to progress more slowly.

If desired for any purpose to obtain mental ages or IQ's of pupils taking the test, use may be made of Table 2, which is read as follows (going down the first column): A pupil making a score of 2 has a mental age of 5 years 1 month; a pupil making a score of 4 has a mental age of 5 years 2 months; a pupil making a score of 6 has a mental age of 5 years 3 months, and so on. If a pupil makes a score between two of those given in the table, he may be given credit for the next higher score.

If desired, an IQ may be obtained for the pupil by dividing his mental age by his chronological age. The reader should understand, however, that in view of the fact that first-grade pupils do not comprise unselected children from the age of 5 to 11, since dull 5-year children have not reached the first grade and bright 9- and 10-year pupils have gone beyond it, it is very difficult to establish accurate mental-age equivalents of scores in the test. Therefore the mental-age equivalents in Table 2 must be regarded as only approximate at best, although derived from nearly

TABLE 2

APPROXIMATE MENTAL-AGE EQUIVALENTS

	YEARS					
MONTHS	5	6	7	8	9	10
0		24	40	52	64	
1	2	26	41	53	65	75
2	4	28	42	54	66	76
3	6	30	43	55	67	77
4	8	32	44	56	68	
5	10	33	45	57	69	78
6	12	34	46	58	70	79
7	14	35	47	59	71	80
8	16	36	48	60	72	81
9	18	37	49	61	72	
10	20	38	50	62	73	82
11	22	39	51	63	74	83

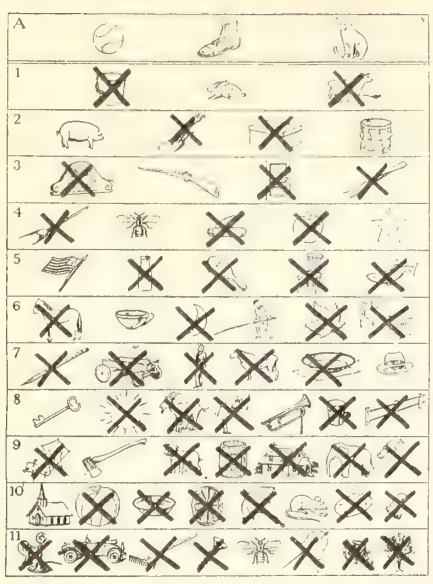
3000 scores. However, this table will serve very well for the purpose of making comparisons of children in the first grade upon the basis of which classification may be made.

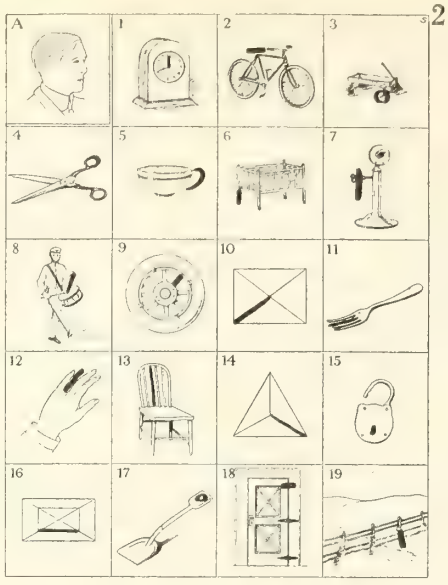
APPLICATION OF RESULTS

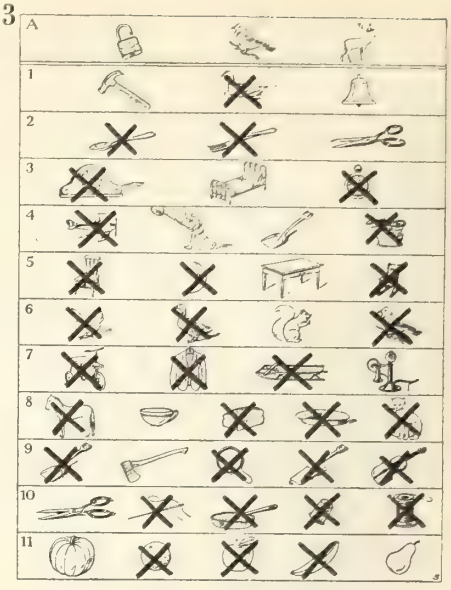
This test is intended as a general measure of mental ability for the purpose of furnishing the teacher with an objective basis for classifying pupils for instruction purposes. It has been found, for example, that if first-grade pupils are divided into three groups sometimes called *X*, *Y*, and *Z*, on the basis of either score or letter rating, the pupils of any one of these groups are much easier to teach together than are the pupils of the whole group. This is for the reason that when bright, normal, and dull pupils are taught in the same group, the bright pupils are held back by the normal and dull pupils and prevented from progressing as rapidly as their ability would permit them and, as a consequence, they form the habit of working at less than their full capacities. If this habit is allowed to persist, a pupil may never achieve as much as he is capable of achieving, for lack of stimulation and encouragement.

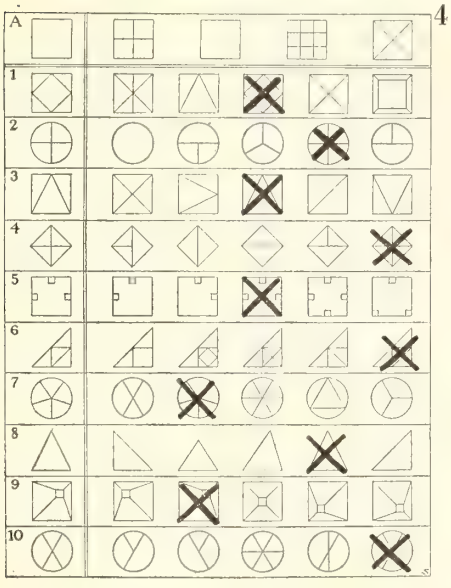
Moreover, when dull pupils are taught with normal and bright ones, they are often forced to progress at too fast a pace. Such pupils often form the habit of believing that school work is too hard for them and that they cannot understand it. They may even develop an inferiority complex which will last through life.

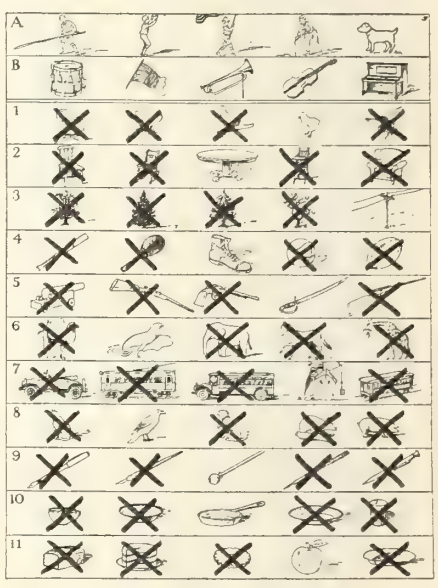
On the other hand, if first-grade pupils are divided into three groups as suggested above, the bright ones may progress as rapidly as their ability warrants or be given an enriched course, and the dull ones may be given instruction suited to their abilities, so that no pupil is either discouraged by too rapid advancement or held back by lockstep with other pupils.











It is suggested that for convenience in scoring the booklets, the scorer mark up one of the examination booklets as shown above and use that marked booklet for scoring until the correct responses have been committed to memory.

If the scorer prefers, however, he may do the scoring directly from the reproductions.

Make a check mark at the right of each picture or row of pictures containing a correct response. As each page is scored, count the correct items and write the number in the blank space at the foot of the page.

When the seven tests have been scored in that manner, copy the scores into the table on the first page of the test and add to find the total score. The maximum total score is 83.

Special Directions for Scoring

Give credit for any mark which clearly indicates that the pupil had the right idea.

Test 2. The minute hand of the clock in Item 1 may be placed at any angle. In Items 11 and 12 the missing prong of the fork and the missing finger must be indicated in the proper place in order to receive credit.

Test 5. *Item 2.* Give credit for marking either or both sleeves of the coat. *Item 10.* Give credit only if the rear legs or feet of the horse are marked. *Item 11.* Give credit only if the front paws of the cat are marked.

Test 6. Give credit for marking any five moons, any six apples, and so on.

Directions for Interpreting Scores

Letter ratings may be assigned to pupils taking the test, by means of Table 1. The table is read as follows: If a pupil's age is between $5\frac{1}{2}$ and 6 years (5–6 to 5–11) and he has made a score between 0 and 4, give him a rating of E, which is intended to represent the lowest 8% of scores of pupils of his age. If he has made a score between 5 and 11, give him a rating of D, which is intended to represent the next lowest 12% of scores of pupils of his age, and so on. Note, for example, that a pupil between 7 and $7\frac{1}{2}$ years (7–0 to 7–5) who has made a score of 69 or over has a rating of A.

" Pencils up. Look at row No. 7; mark two things we ride on, and the thing that we wear. Mark." (Ten seconds.)

" Pencils up. Look at row No. 8; mark two things that run, and two things that we eat. Mark." (Ten seconds.)

" Pencils up. Look at row No. 9; mark two things we dig with, the thing that we play on, and the thing we look into. Mark." (Ten seconds.)

" Pencils up. Look at row No. 10; mark the last three things we sew with, and the thing we cook with. Mark." (Fifteen seconds.)

" Pencils up. Look at row No. 11; mark the first three of the four things that grow on trees. Mark." (Fifteen seconds.)

" Now turn over the book to page 4." (Show how if necessary.)

TEST 4

" Make a little mark with your pencil in the very first block at the top of the page where the letter ' A ' is. Now find another little block in the same row just like it, and mark that block too." (Show how.)

" Now mark the very first little block in row No. 1. Now, find another little block just like it in that row and mark it. Mark." (Five seconds.)

" Pencils up. Fix each row of blocks just like that. Mark the first little block in the row and then mark the one that is just like it. Go ahead and fix every row of blocks. Ready, go." (Two minutes.)

" Stop, turn over the book to page 5."

TEST 5

" We are going to mark some of the things in these pictures. Listen carefully and I will tell you just what part to mark in each line. Look at the top line at ' A.' Mark the part of the knife that cuts." (Repeat if necessary, and see that the pupils have marked the right thing.)

" Pencils up. Look at row No. 1; mark the part of the umbrella that keeps the rain off. Mark." (Five seconds.)

" Pencils up. Look at row No. 2; mark the part of the coat we put our arms in, and the part of the hammer we pound with. Mark." (Five seconds.)

" Pencils up. Look at row No. 3; mark the part of the wagon we ride on, and the part of the broom we sweep with. Mark." (Five seconds.)

" Pencils up. Look at row No. 4; mark the part of the chair we sit on, and the part of the shears that cuts. Mark." (Five seconds.)

" Pencils up. Look at row No. 5; mark the part of the pencil that writes, and the part of the pump where the water comes out. Mark." (Five seconds.)

" Pencils up. Look at row No. 6; mark the part of the pail to carry it, the part of the drum we beat, and the part of the clock that rings. Mark." (Ten seconds.)

" Pencils up. Look at row No. 7; mark the part of the shovel and the hoe we dig with, and the part of the tree that gives the most shade. Mark." (Ten seconds.)

" Pencils up. Look at row No. 8; mark the part of the key that goes into the lock, the part of the lock where the key goes, and the part of the tea kettle where the water comes out. Mark." (Ten seconds.)

" Pencils up. Look at row No. 9; mark the part of the telephone we talk into, the part of the knife and of the ax that cuts, and the part of the house we walk into. Mark." (Fifteen seconds.)

" Pencils up. Look at row No. 10; mark the part of the automobile we sit in, the part of the bottle where the milk comes out, the part of the candle that gives light, and the part of the horse that kicks. Mark." (Fifteen seconds.)

" Pencils up. Look at row No. 11; mark the part of the bird that pecks, the part of the face that talks, the part of the bee that helps him fly, and the part of the cat that scratches. Mark." (Fifteen seconds.)

" Now turn over to page 6."

TEST 6

" Look at the big number in the same box where the balls are. How many does the big number say? " (Pause for reply.) " Yes, it says two, and that means we are to mark just two balls. So put marks on just two of the balls." (Five seconds.)

" Now look at the big number with the bells. What does it say? " (Pause for reply.) " Yes, it says three. So we are to mark three of the bells. Mark any three of the bells." (Five seconds.)

" Now we won't say how many of the moons, but you are to mark as many as the big number says. Do it." (Ten seconds.)

" Now mark as many apples as the big number says. Do it." (Ten seconds.)

" Pencils up. Mark every set of things on this page. Mark as many as the big number says. First for the fish, then the bunnies, then the pigs, then the birds, and so on. Ready, go." (Two minutes.)

" Stop, turn over to page 7."

TEST 7

" Now look at the very top line, at ' A.' What four things on that line are most alike? " (Pause for reply.) " Yes, the four boys. What thing in that line is not like them? " (Pause for reply.) " Yes, the dog is not like them. Mark all four of the boys because they are alike, but don't mark the dog. Do it." (Ten seconds.)

" Now look at line ' B.' What four things are most alike? " (Pause for reply.) " Yes, the four things we play music on, the things we make music on. What thing is not like them? " (Pause for reply.) " Yes, the flag is not like them. So we will mark the four things we make music on, but we won't mark the flag. Do it." (Ten seconds.)

" Look at line No. 1. We won't say what things are alike, but you are to mark the four things that are alike, and don't mark the one other thing in the row that is not like the rest. Do it." (Ten seconds.)

" Pencils up. Now mark the four things in the next line that are alike and then four in the next line. Do all the page. Ready, go." (Two minutes.)

" Stop, turn the book over. You did very well."

Directions for Scoring

The correct responses for each of the seven tests except Test 6 are given on the next page, on which the test pages are reproduced in small size. These reproductions show how the pages are to be marked by the pupils.

DETROIT FIRST-GRADE INTELLIGENCE TEST

By Anna M. Engel

Psychological Clinic Examiner, Detroit Public Schools

EXAMINATION: FORM A

School_____ Date of test_____ Score_____

Last name_____ First name_____ Initial_____

Place of birth_____ Color_____

Date of birth	Mo.	Day	Year	Sex
				M ☐ F ☐

Terms in Kindergarten_____ Terms in B1_____

Country of Birth
Child
Father
Mother
Home language

TEST RECORD

No. of Test	Name of Test	Score
1	Information	
2	Similarities	
3	Memory	
4	Absurdities	
5	Comparisons	
6	Relationships	
7	Symmetries	
8	Designs	
9	Counting	
10	Directions	
	Total	

Rating_____

Group_____

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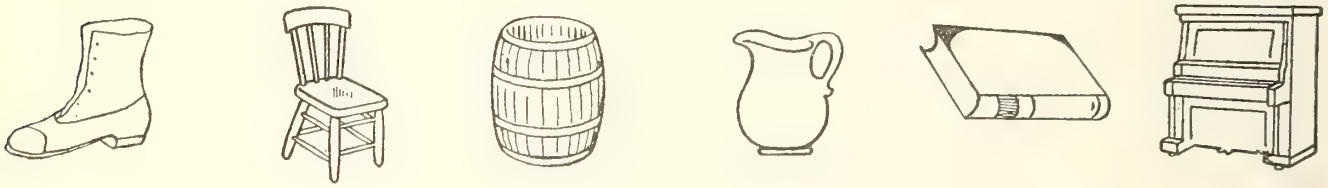
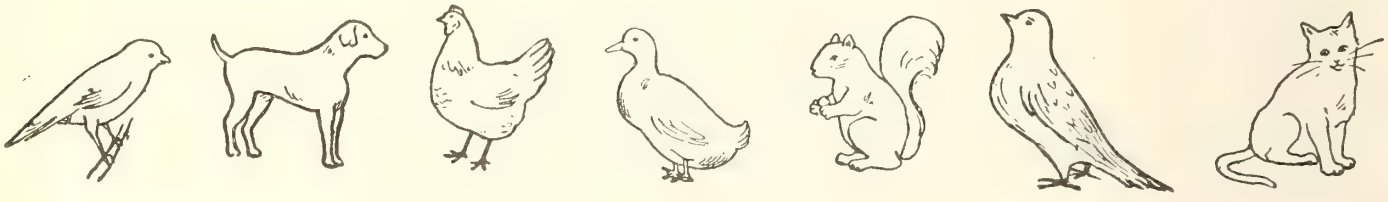
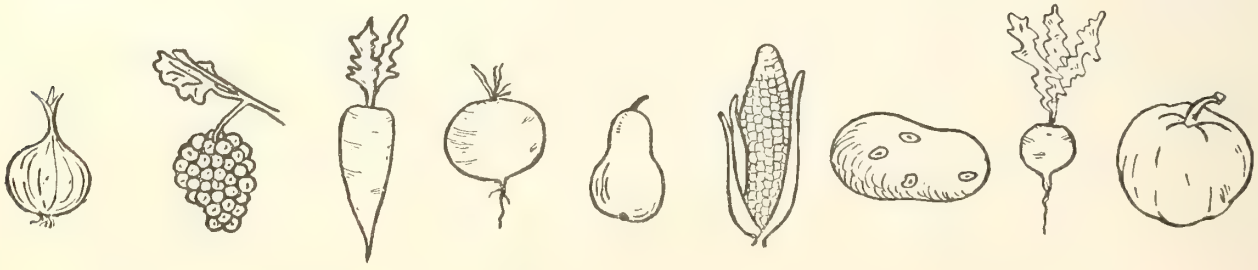
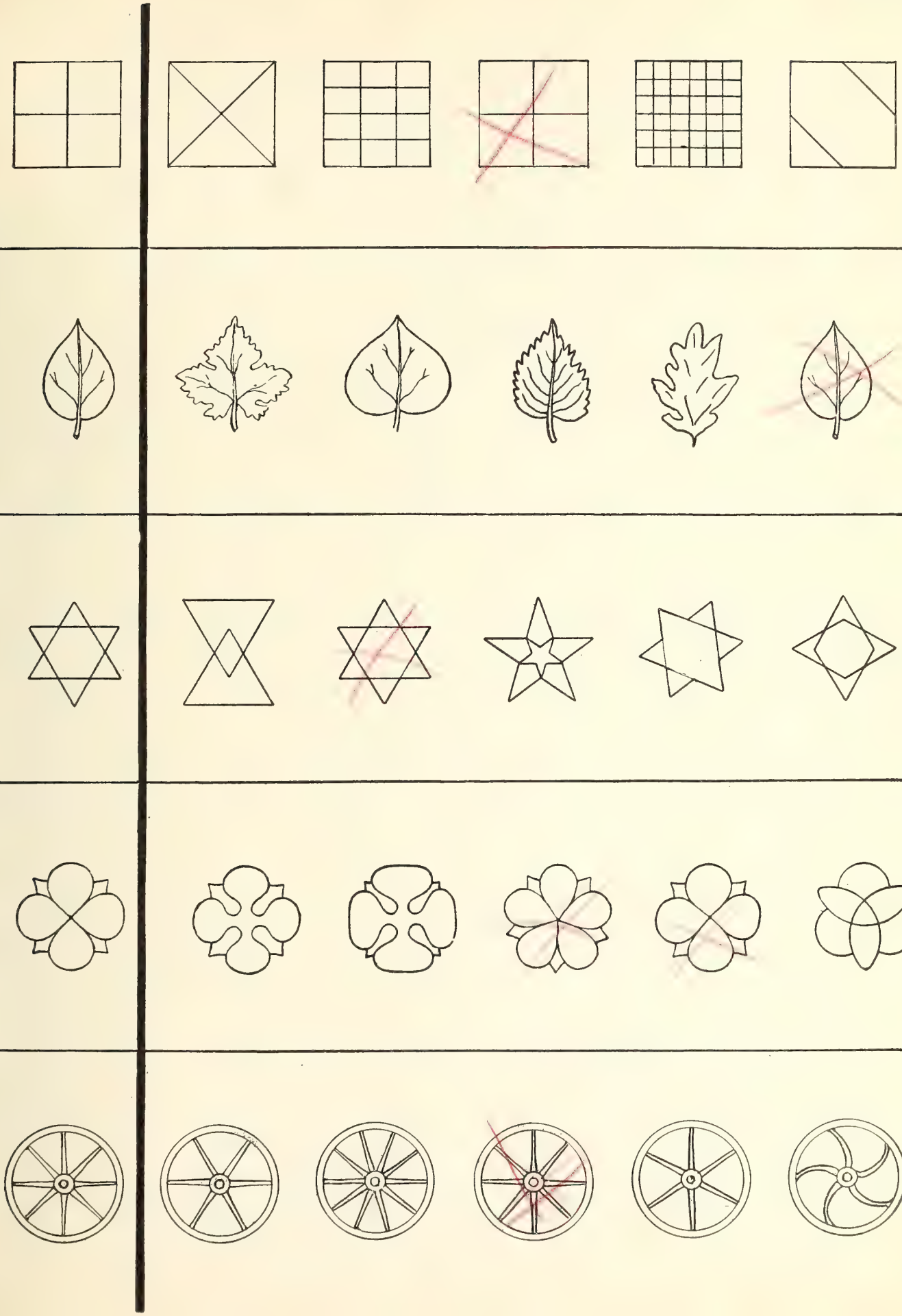
Test 1









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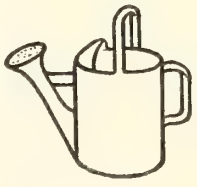

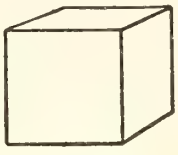
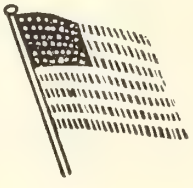

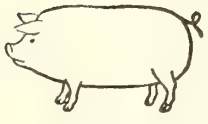

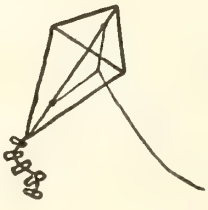

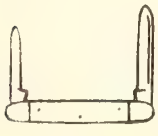
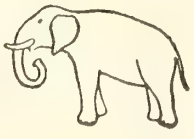

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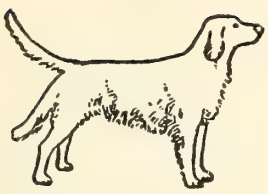
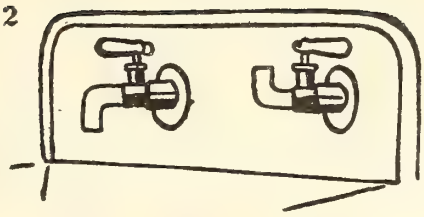
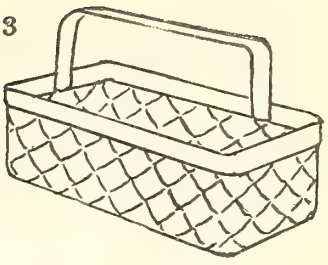
1 

2 

3 

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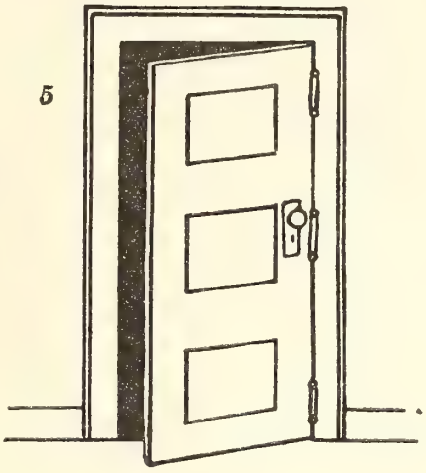
5 

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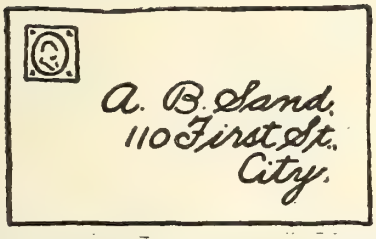

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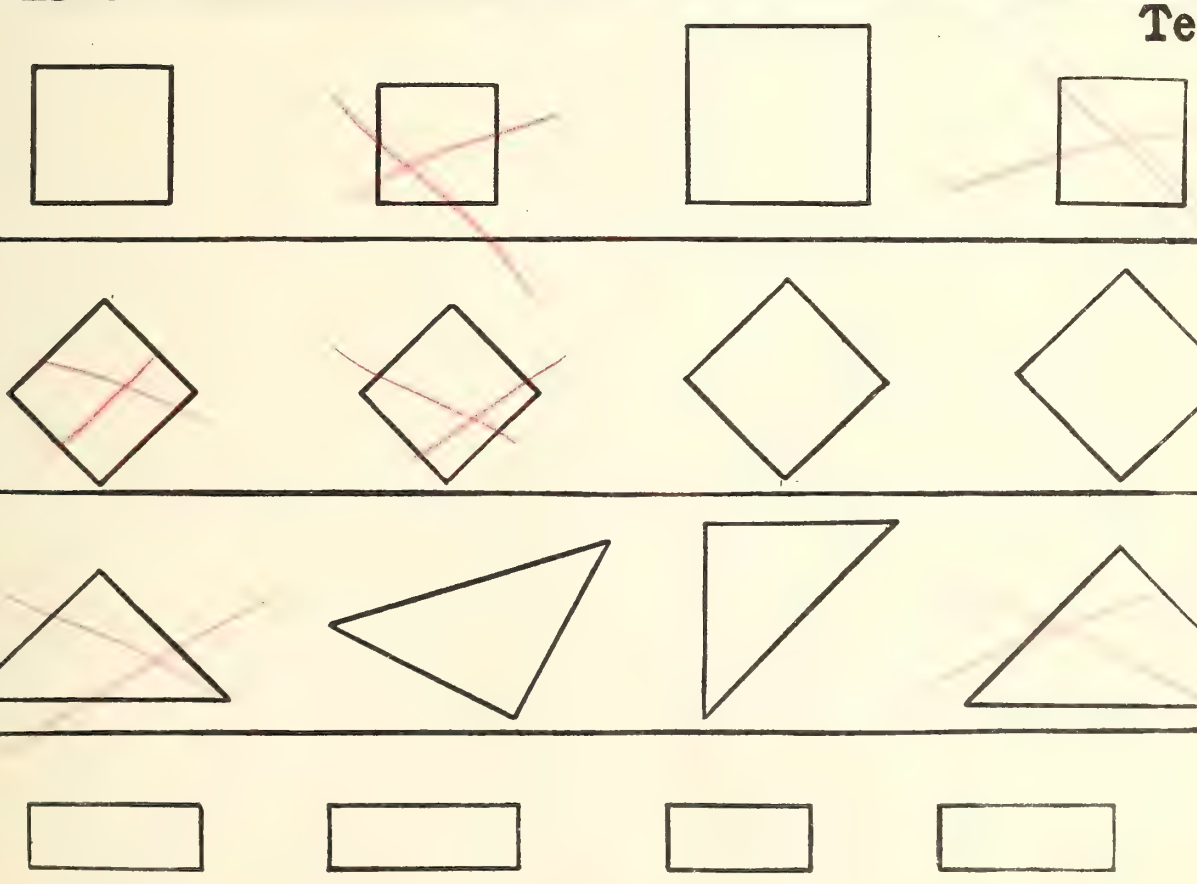

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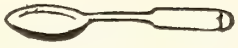

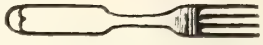

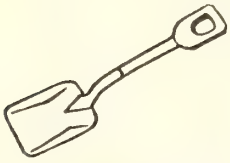

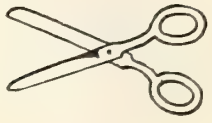

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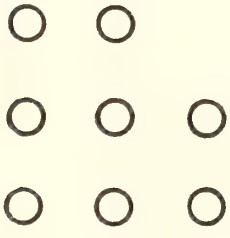

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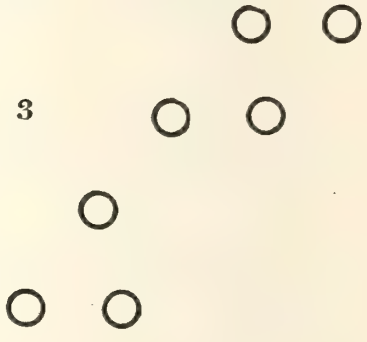

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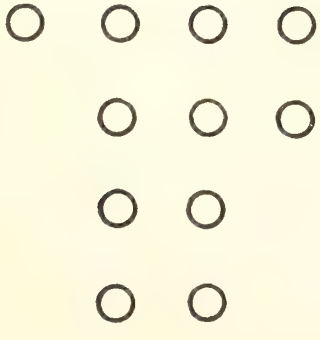

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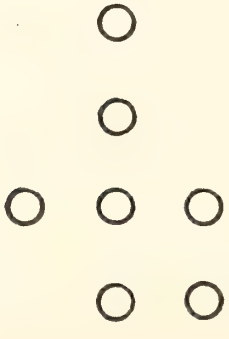

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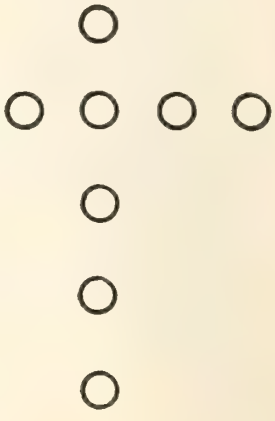

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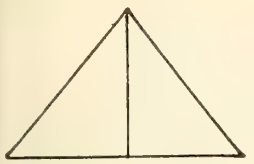

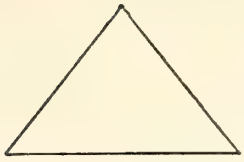

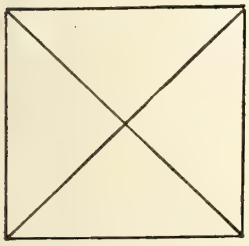

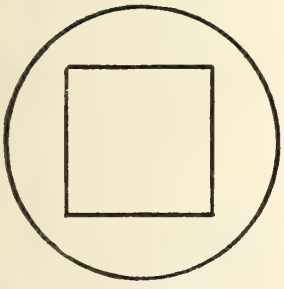

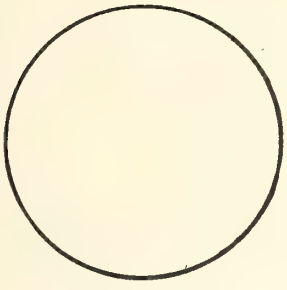

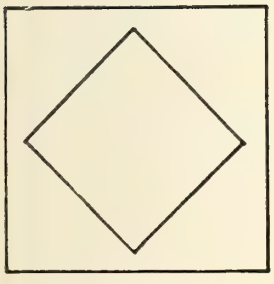

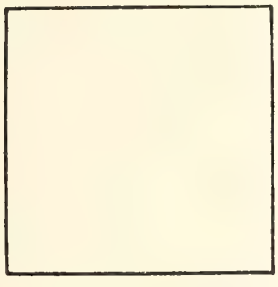

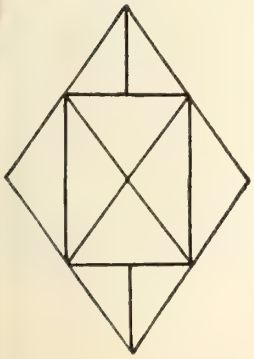

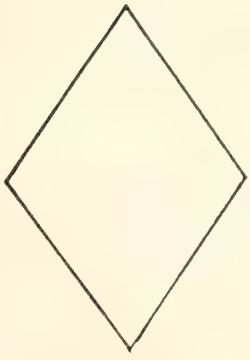

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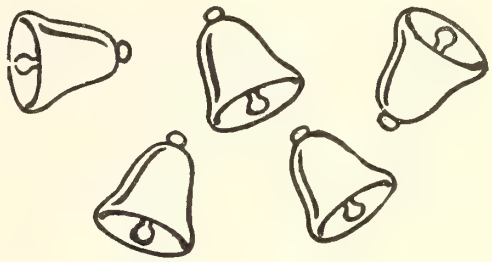

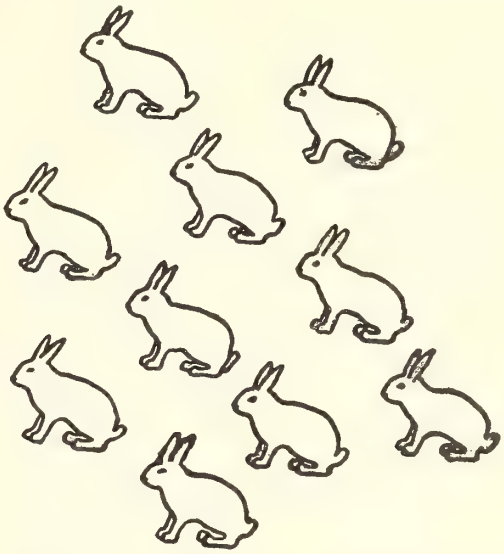

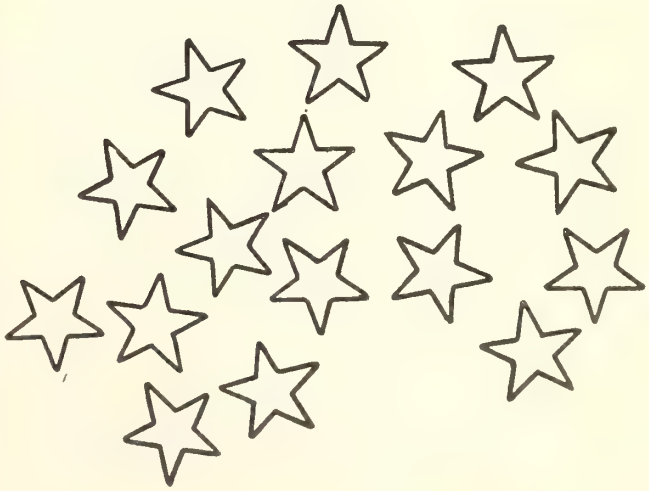

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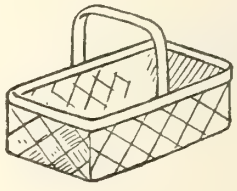

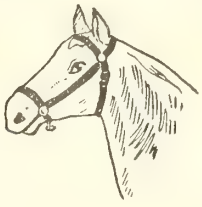

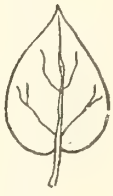

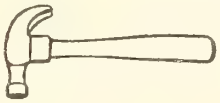

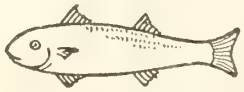

DETROIT FIRST-GRADE INTELLIGENCE TEST

By Anna M. Engel

Psychological Clinic Examiner, Detroit Public Schools

MANUAL OF DIRECTIONS AND KEY: FORM A (*REVISED*)

Introductory

The purpose of this group test is to aid in the proper classification of the children entering the first grade.

There is no time limit to the test. It will be necessary to watch the group to see that they understand the directions and make an attempt to do what they are told to do. The children should not be hurried, but on the other hand it is well not to wait so long for a slow child that the rest of the group loses interest. Little children need to be constantly stimulated by the examiner so that they will attempt to do each new item of the test. Ten children make a desirable group, and in no case should more than twelve be examined at one time.

Directions for Administering

The necessary data called for on first page of test booklet should be filled in by the classroom teacher before test is given.

When ready to give the test, pass out the booklets, being careful to see that each child has the book bearing his own name. See that each child has a pencil with large, soft lead, since large marks aid in scoring. A soft crayon will do. See that each child has a desk of his own so that he will be comfortable throughout the test.

The directions to be read to the pupils are printed in bold type. Read them exactly as printed, omitting whatever is in parentheses. Do not attempt to memorize the instructions. Give the instructions for each line, slowly and clearly. See that you have the children's attention before giving each new direction. See that the directions are understood by helping, if necessary, with the first line of each test. Give no help after the first line of each test, and do not repeat any directions.

Keep the children interested, and encourage them to try each test by saying at intervals, "Do it!" or "Do it now!" etc.

The first six tests require only the making of a mark. See that the child understands what is meant by a "mark," as shown in Test 1, line 1. Watch to see that the children place the mark *on* the drawing.

Do not begin with a new group too near dismissal time, as the children become uneasy if kept after the others have gone.

When the papers have been passed, say: **Children, we are going to play a game today. Listen to me and I will tell you just what to do. Open to the first page and turn it back like this.** (Show how.) **Now pick up your pencils.** (Read the directions for each test as given on the following pages.)

Directions for Scoring (Weighted Scores)

The right answer to each item of the test, when not obvious, is indicated by an asterisk or otherwise. To score a pupil's paper, compare each response with the answers indicated herein.

By the method of scoring provided in the unrevised Manual of Directions each right answer counts one point.

A revised method of scoring is recommended by the author as giving a more normal distribution of scores and better differentiating the bright pupils. It is the method that has been used by the author in Detroit for three years. By the revised method certain of the more difficult items are given three points each and the others one point each.

If the revised method is used, indicate each correct item by a 1 or a 3, — a 3 in the case of those items followed by (3) in the accompanying pages (as, for example, the fourth and fifth items in Test 1) and a 1 in the case of each of the others. The score by this method is the sum of the 1's and the 3's.

Each row counts as one item in Tests 1, 2, 3, 5, 6, 9, and 10. The item is counted wholly wrong if the pupil has marked more or less than the specified number of objects. The maximum score on each of the tests and in the total score is as follows:

Test	1	2	3	4	5	6	7	8	9	10	Total
Maximum Score	9	7	7	7	4	4	8	9	4	7	66

Special Directions

Test 4: Either tail of the dog may be marked; in the basket picture the mark must indicate that the handle is misplaced; in door picture, mark must indicate that knob is misplaced.

In Tests 4 and 7, where you think the child understood the direction even if the mark is poorly executed, give him the benefit of the doubt.

Test 8: In Items 3 and 4 size and spacing are not considered, but the square must have at least three fairly good right angles and the diamond must approximate the original in form. In Item 5 each corner of inner rectangle must touch outer figure.

Test 9: It is immaterial which of the pictures in each group are marked, as long as the required number are marked.

Test 10: Any kind of line is correct if it meets requirements.

Age Norms

In response to requests for mental-age equivalents, the following table has been compiled from the weighted scores of 5085 first-grade pupils. It will be understood, of course, that this table cannot be used with unweighted scores as found by the method provided in the unrevised Manual of Directions.

Mental-Age Equivalents of Weighted Scores

Score	Mental Age	Score	Mental Age
62	8–6		
60	8–5	34	6–5
59	8–4	33	6–4
57	8–3	32	6–3
56	8–2	31	6–2
54	8–1	30	6–1
53	8–0	29	6–0
52	7–11	28	5–11
51	7–10	27	5–10
50	7–9	26	5–9
49	7–8	25	5–8
48	7–7	24	5–7
47	7–6	22	5–6
46	7–5	21	5–5
45	7–4	20	5–4
44	7–3	18	5–3
43	7–2	17	5–2
42	7–1	15	5–1
41	7–0	14	5–0
40	6–11	12	4–11
39	6–10	11	4–10
38	6–9	9	4–9
37	6–8	8	4–8
36	6–7	6	4–7
35	6–6	4	4–6

(*See last page for further directions for interpreting scores*)

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Test 1

Look at the top row of pictures. Mark the thing that grows on a tree. (If the children fail to make a mark *through* the picture, step to the board, draw an apple, and say:) **See! a mark means a line right through the picture, like this.** (Make a mark through the picture.)

*

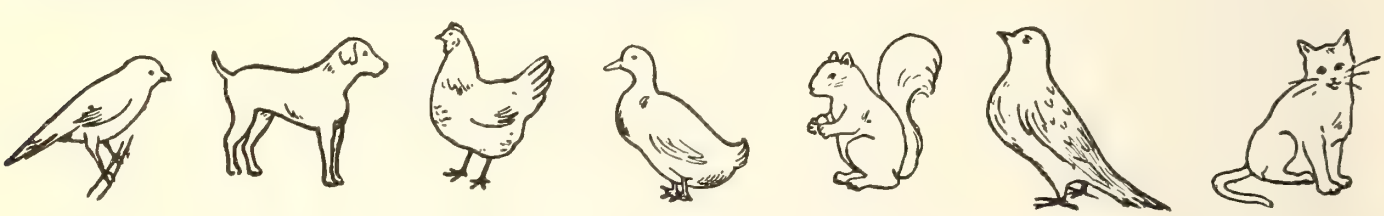
Look at the next row. Mark two things we cut with.

* *

Look at the next row. Mark three things made of wood.

* * *

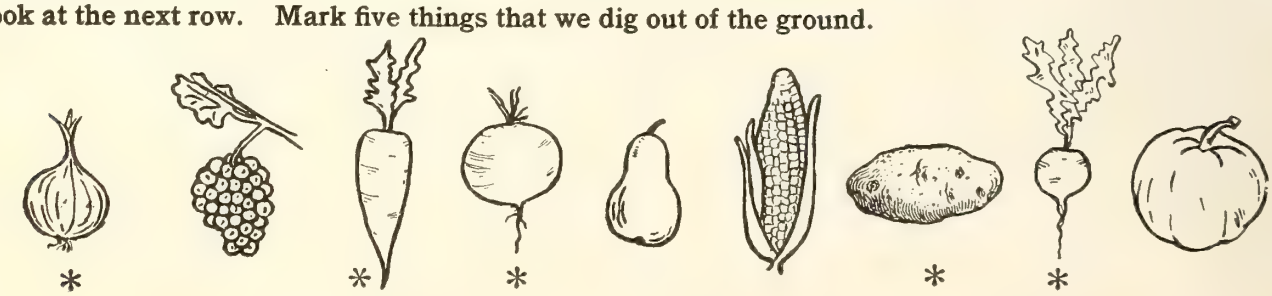
Look at the next row. Mark four things that lay eggs.



* * * *

(3)

Look at the next row. Mark five things that we dig out of the ground.

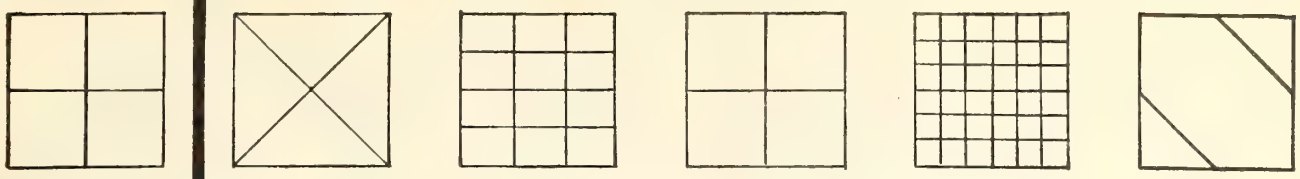


* * * * *

(3)

Turn over the book.

Mark the first little window. (If necessary, show the pupils how and correct any errors.) **Find the other window like it and mark the other window. Be sure to draw the line through the picture.**



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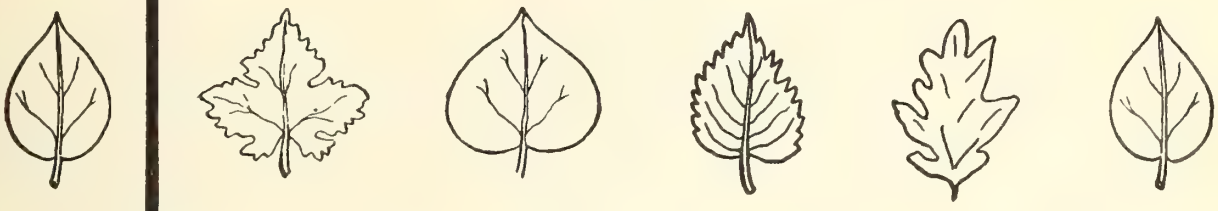
Mark the first leaf. **Now mark the other leaf that looks just like it.**



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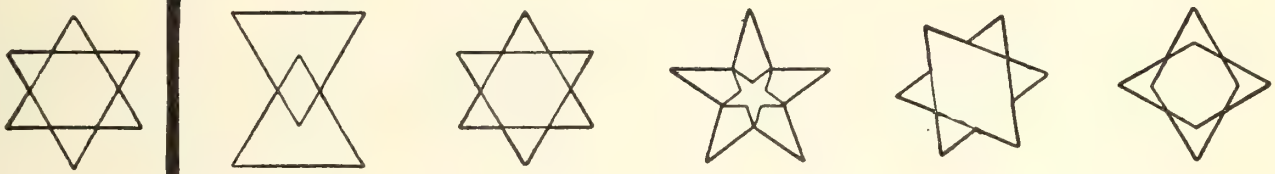
Mark the first star. **Mark the other star that looks just like it.**



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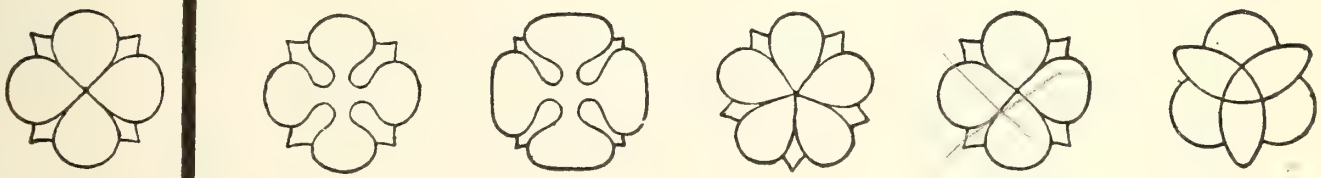
Mark the first flower. **Mark the other flower that looks just like it.**



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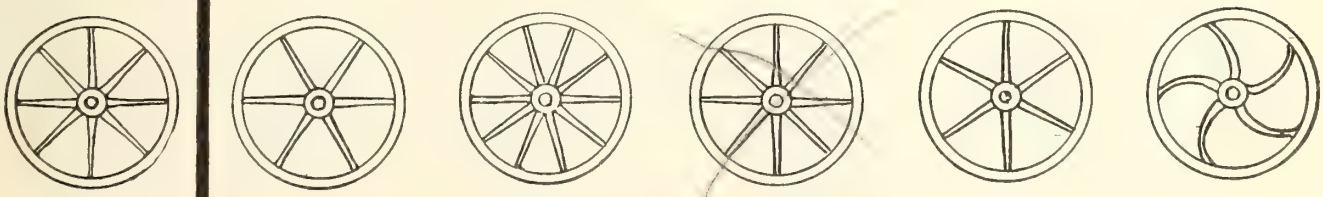
Now mark the first **wheel. Mark the other wheel that looks just like it.**



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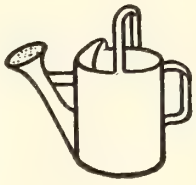
Turn over the page and fold the book back like this. (Show how.)

Test 3

We are going to mark some of these pictures. Look at the top row. Put a mark on the wagon.

*

Now hold your pencils up like this. (Show how.) Now mark the apple and the cat. Do it!



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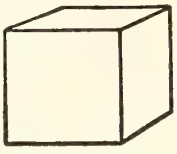
Hold pencils up like this! Mark the pail, the box, the star. Do it!



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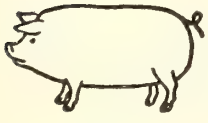
Hold pencils up! Mark the bottle, the pig, the bunny, the chair. Do it!



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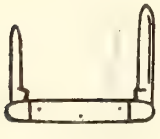
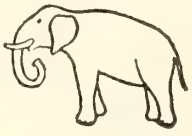
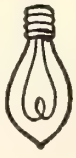
Hold pencils up! Mark the broom, the knife, the cow, the hand, the shovel. Do it!



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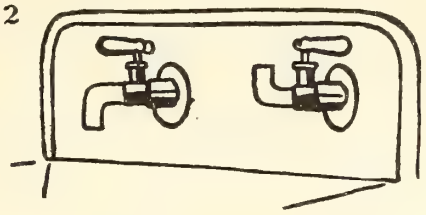
Turn over the book.

Test 4

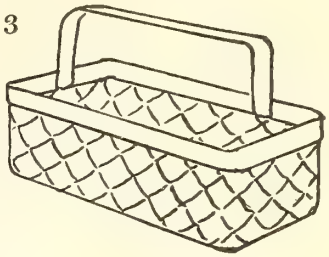
Look at these pictures. There is something wrong with every one. What is the matter with the dog? Yes, he has two tails. Mark the wrong tail. (It is immaterial which tail is marked.) Mark the wrong thing in the sink picture; in the basket picture; in the boy picture; in the door picture; in the teapot picture; in the letter picture.

1

2

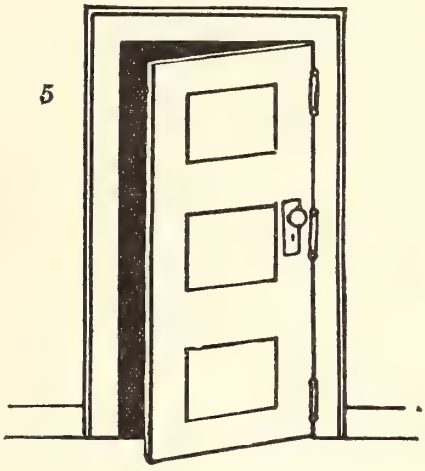


3



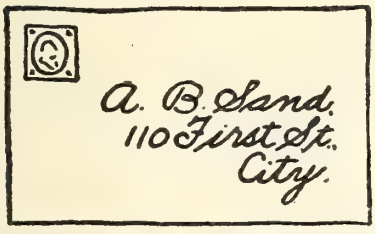
6

5



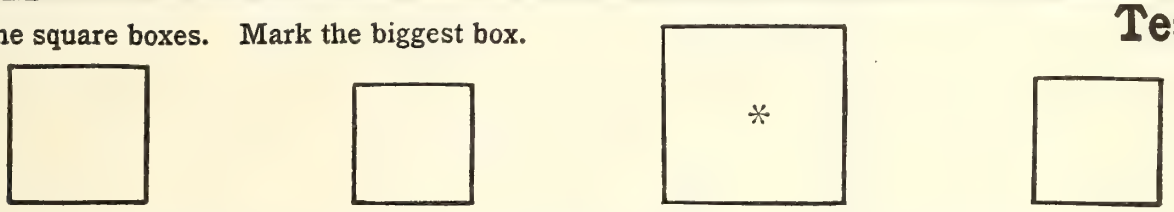
4

7

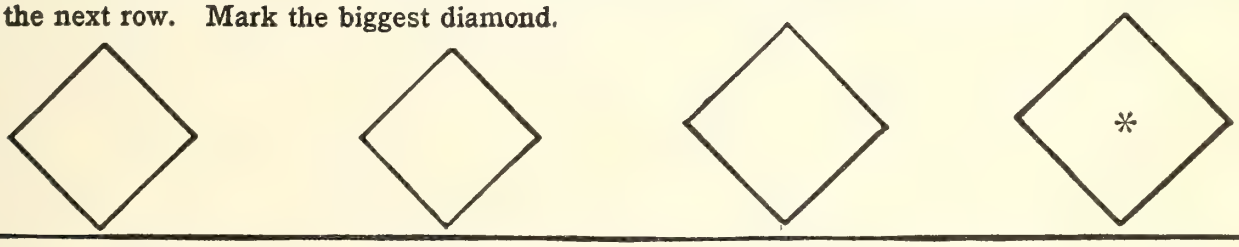


Test 5

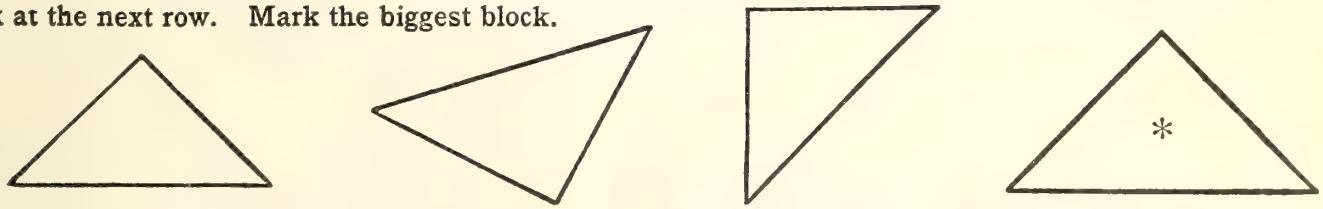
Look at the square boxes. Mark the biggest box.



Look at the next row. Mark the biggest diamond.



Look at the next row. Mark the biggest block.



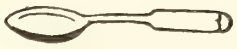
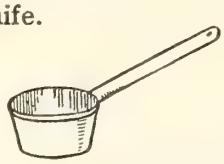
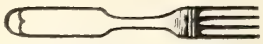
Look at the next row. Mark the biggest block.

Turn over the page and fold the book back like this. (Show how.)

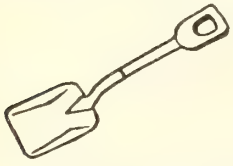
Test 6

Look at the first row of pictures. Mark the thing you put on your foot.

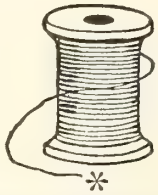
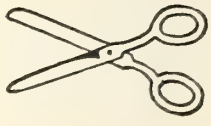
Look at the next row. Mark the thing you use with a knife.

Look at the next row. Mark the thing you use with a broom.



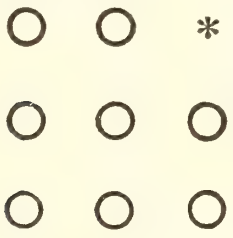
Look at the next row. Mark the thing you use with a needle.

Test 7

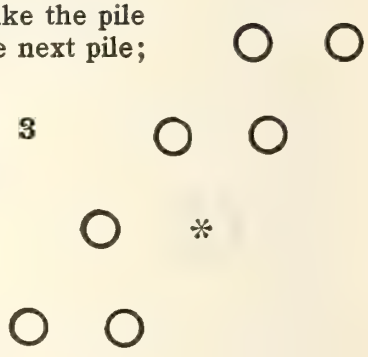
Look at these balls. (Point.) One ball is gone from every pile. Where is the one ball gone from this pile? See, one ball is gone right here (Point.) to make the pile look right. Draw in that ball. (Show how.) Draw the one gone from the next pile; and the next pile.

1



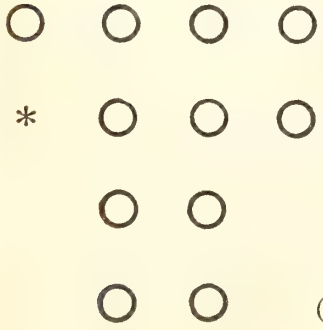
2

3

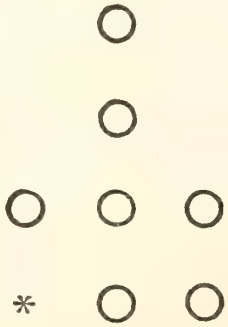


Draw the one gone from the next pile; and the next pile; etc.

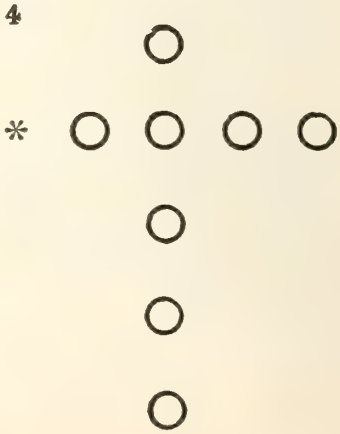
6



5



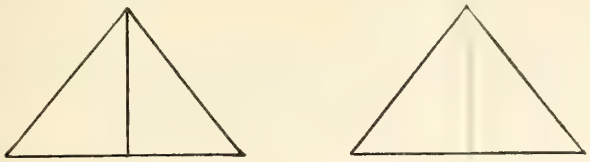
4



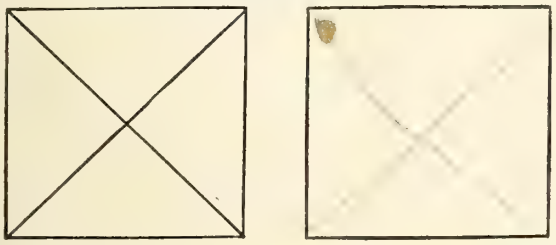
Turn over the book.

Test 8

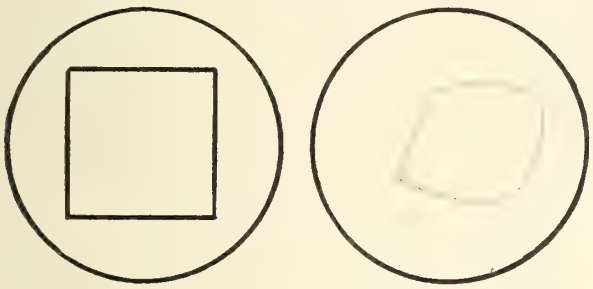
Look at the 2 blocks at the top. (Point.) **Put a line in this second block so that these 2 blocks will look alike.** (Give help where necessary.)



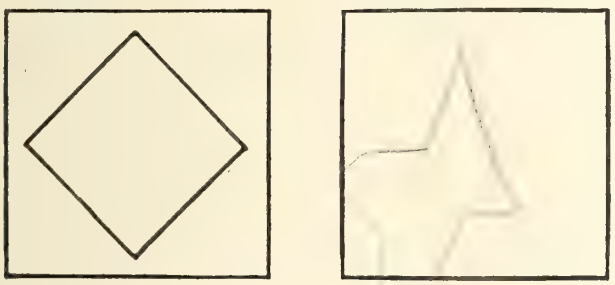
(Point.) **Draw 2 lines in this box so that these two boxes will look alike.**



(Point.) **Draw a box in this ball so that these two balls will look alike.**

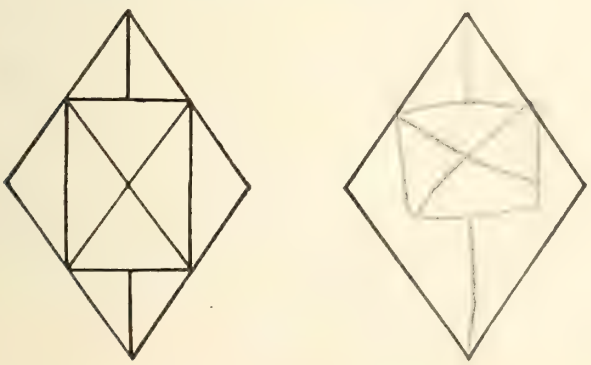


(Point.) **Draw this picture in this box so that these two boxes will look alike.**



(3)

(Point.) **Make the last 2 look alike.**

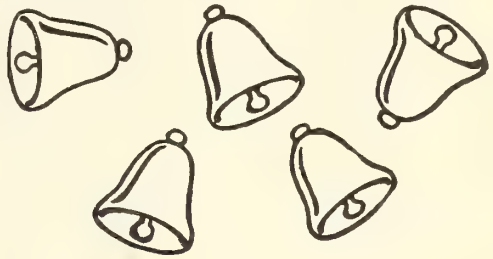


(3)

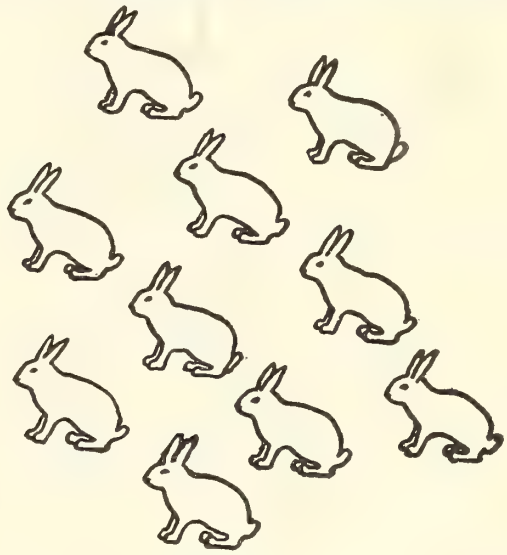
Test 9

See these chairs? Mark 2 of the chairs. (Correct errors, first line.)

See the bells? Mark 4 of the bells.



See the bunnies? Mark 8 of the bunnies.

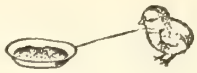


See the stars? Mark 13 of the stars.

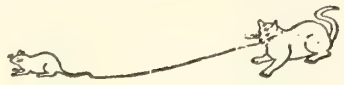
Turn over the page and fold the book back like this. (Show how.)

Test 10

Look at the chicken and the pan. Draw a line from the chicken to the pan. Do it!



Pencils up! Look at the cat and the rat. Draw a line from the cat's mouth to the rat's tail. Do it!



Pencils up! Draw a line from the ball to the basket that will go up over the top of the star. Do it!

Pencils up! Draw a line from the horse to the cup that will go down under the umbrella and the leaf. Do it!

Pencils up! Draw a line from the chair to the dog that will go down under the hammer and up over the fish and the girl. Do it!

(3)

Pencils down. Turn the book over. You did very well.

(*Continued from page 1*)

Letter Ratings

It is suggested that the pupils be given letter ratings on the basis of brightness, using the letters A, B, C+, C, C−, D, and E. For convenience, the accompanying table is used in Detroit. This table is read as follows:

Of first-grade pupils having ages of 5 years 9 months or less, those making scores between 0 and 8 are given a rating of E; those making scores between 9 and 13 are given a rating of D; etc.

Classification of Pupils

It is suggested that the pupils be classified into at least three groups for instruction purposes. In Detroit, pupils are divided on the basis of letter ratings and age into X, Y, and Z groups, as shown in the table below. Thus, pupils of 5 years 9 months or less who receive ratings of E, D, or C− are placed in a Z group; those who receive ratings of C, C+, or B are placed in a Y group; etc.

Detroit Table of Classification

	Group	Z			Y			X
	Rating	E	D	C−	C	C+	B	A
Age	5–9 or less	0–8	9–13	14–19	20–27	28–36	37–42	43–66
	5–10 to 6–3	0–11	12–17	18–25	26–34	35–40	41–46	47–66
	6–4 to 6–9	0–15	16–21	22–30	31–38	39–44	45–51	52–66
	6–10 to 7–3	0–19	20–27	28–35	36–42	43–48	49–56	57–66
	7–4 to 7–9	0–24	25–33	34–41	42–47	48–54	55–61	62–66
	7–10 or more	0–29	30–40	41–47	48–55	56–61	62–64	65–66
	Group	Z	Y			X		

Pupils in the X group may be given an enriched course of study or will be found able to progress more rapidly than the normal (Y) group. The Z group may be given preparatory instruction or allowed to progress more slowly than the normal group.

Haggerty Intelligence Examination

DELTA 2

FOR GRADES 3–9

Arranged and standardized by M. E. Haggerty, University of Minnesota

MANUAL OF DIRECTIONS

CONTENTS

		PAGE
I.	When Are Intelligence Tests Satisfactory? 1. Discriminative Capacity — 2. Reliability — 3. Significance	1
II.	Who Can Give Intelligence Tests? 1. Teaching and Testing — 2. Practice in Testing	2
III.	General Directions	3
IV.	Directions for Giving the Test	3
V.	Directions for Scoring and Recording 1. General Rules — 2. Total Score — 3. Class Record Sheet — 4. Qualities — 5. Median Score	5
VI.	Norms	6
VII.	How to Use Results of Tests 1. For Grouping Pupils — 2. Caution	7

I. WHEN ARE INTELLIGENCE TESTS SATISFACTORY?

Tests should meet certain statistical criteria if the results secured from them are to be usable for diagnostic and administrative purposes. The most important of these are discussed here for the guidance of school officers in selecting the tests which they will use. Data are presented showing the extent to which the Haggerty Intelligence Examination meets these requirements.

1. Discriminative Capacity

Every test should serve to distinguish one individual from another and to discriminate the individuals of a group so that each is properly placed in his relative position as regards the trait which is measured. If one individual has a certain amount of intelligence, and another has enough more of the same trait to make a real difference between the two individuals, then the test must show this difference properly. This means that the units in which the test measures must be sufficiently small to measure all significant differences and that the range of the test from low score to high score must be great enough to measure extreme cases, whether these extreme cases have much or little of the trait in question.

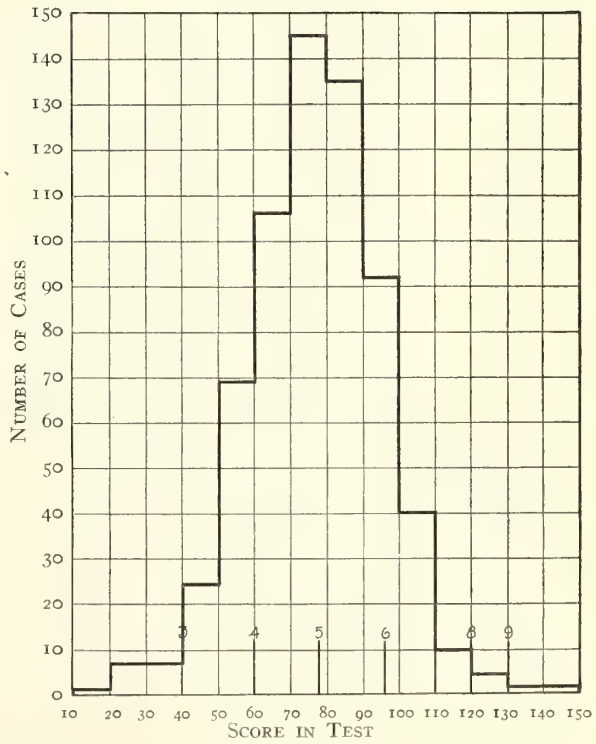
More specifically, discriminative capacity means two things: First, that the size of the measuring units is adequate for the measurement of significant differences; and second, that a group of persons selected at random will distribute themselves along a scale, with few or no individuals making zero scores, a very large number of individuals making average scores, and a small number or no individuals making perfect scores.

The figure below, which gives the surface of frequency for a group of persons measured by the Haggerty Intelligence Examination: Delta 2, shows that it has adequate discriminative capacity.

An examination that is to be useful in school measurement should show two additional criteria. First, each school grade or half-grade should show a median score higher than the median score of the grade or half-grade next below, and the intergrade steps should be definitely determinable. In how far the test meets this require-

Frequency Distribution for Haggerty Intelligence Examination: Delta 2 — 640 Cases in Grade 5

(Verticals numbered 3, 4, 5, 6, 7, 8, and 9 indicate median scores for corresponding grades.)



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HIE : DELTA 2 : MD–1

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ment may be seen from the tables of standard grade scores, page 7. Second, the median deviation from the central tendency shown in the test should not be large in the case of any well-graded class. As a satisfactory measure for the classification of school children the median deviation should not exceed the increase of scores shown from one grade median to that of the next grade above.

A test, then, has satisfactory discriminative capacity when it measures individuals in sufficiently definite units properly to represent their actual traits, when it shows large groupings near a midpoint on a series of measures, when it shows few zero and few perfect scores, when it shows definite and clearly distinguishable intergrade steps, and when the median deviation for any well-grouped class is small. The test described here meets these requirements in a highly satisfactory degree.

2. Reliability

About any test which can be given, whether it be an achievement test or an intelligence examination, there is a certain unreliability. By this is meant that if the test were given again to the same pupils, certain of them would score higher and others would score lower. This unreliability inheres also in teachers' judgments and, in a theoretical sense, in every measurement that can be made, whether that measurement be of human capacities or of physical facts. Science has found no way to eliminate this unreliability, but has devised ways of measuring it and of compensating for its presence. In the use of intelligence or achievement tests the fact of unreliability must be carefully considered if conclusions regarding overlapping, inaccurate classification, or school progress are to be dependable.

Obviously a satisfactory test should give the same result each time it is used. The score from a test which gives one result one day and a different result when the test is repeated or a similar one given, is undependable. No important inference can be made from a score so obtained and no practical procedure can be based upon it, since a retrial might invalidate such inference or procedure altogether.

An important method for determining the reliability of the test is to repeat the test and to calculate the correlation between the results of the first trial and those of the second. If this correlation is high, it may be inferred that the test is reliable and that the score which an individual makes the first time is a fair index of what he will do on repeated trials. The Haggerty Intelligence Examination: Delta 2 has been subjected to this method of determining reliability. It was given to an entire school one morning, and in the afternoon of the same day the same test was given to the same pupils. The correlation between the standing of children in the morning and in the afternoon trials was .90. The average increase in score was 12 points. Between the first and second trials the separate tests showed coefficients of correlation ranging from .71 to .86. The use of these tests with other groups confirms the results here reported.

3. Significance

It has been found that the so-called "cancellation tests" give no results that are worth while. The ability to cancel certain figures or letters on a page is not in itself of much importance, and success in this activity does not indicate the possession of any other desirable trait. On the other hand, a high score in an opposites test indicates the possession of important mental abilities other than the ones tested. To be significant an examination must have a content which is in itself a desirable possession for an individual, or success in the examination must give a dependable basis for inferring the possession of desirable traits not directly measured. Thus, from the score which a pupil makes in an intelligence test it should be possible to infer that pupil's capacity to do school work. The statistical method for determining the significance of a test is that of determining the coefficient of correlation between the test and other admittedly significant measures of capacity or achievement. If such coefficients are high, the test is in so far significant, but low coefficients of correlation show low significance or none.

In a group of 60 college seniors the Haggerty Intelligence Examination: Delta 2 showed a correlation with the combined scores of seven group intelligence tests (Army Alpha, Thurstone, Pressey, Otis, Miller, Reading Examination: Sigma 3 and Delta 2) of .892. Excepting the Army Alpha, the Delta 2 examination showed the highest correlation with the total score of all seven tests. For 100 eleven-year-old pupils in the Richmond schools the correlation of the Delta 2 with a criterion composed of four times the grade location plus the teacher's rating for intelligence, the coefficient of correlation was .77. For 300 pupils ranging from Grades 3 to 7 the coefficient of correlation for the Delta 2 with the same criterion was .86.[1] Stenquist reports the correlation between Delta 2 and National Intelligence Test, Scale A, of .81.

II. WHO CAN GIVE INTELLIGENCE TESTS?

Teachers will not have an adequate appreciation of the significance of intelligence or of the part it plays in the education of children until they learn to give intelligence examinations and to interpret the results of the tests. They should learn through actual experience in giving and scoring tests how great the differences of intelligence among children of the same age really are. Only when

[1] A fuller discussion of this subject will be found in *Virginia Public Schools*, Part 2 (World Book Company, Yonkers-on-Hudson, New York; 1921).

they deal with concrete cases measured in definite terms will they be able to direct their school work so as to secure the best results. It is fortunate that in the development of methods of intelligence examination we have arrived at the place where a good teacher can safely give the tests. The development of group methods enables her to do this for all the children who come under her direction.

The average teacher, however, cannot make an adequate psychological diagnosis of complicated and difficult cases. Such children should have the services of an expert psychologist. The point to be urged here is that an intelligent teacher can be quickly taught how to give and score intelligence tests. In almost any school system there is some teacher, principal, or supervisor who has had sufficient training in normal school or college to enable him to follow the directions here given. Such a person can be used to train others, and with proper perseverance and precautions an entire corps can be taught to do the work.

1. Teaching and Testing

A handicap which even the good teacher suffers in giving tests is his well-established teaching habits. These lead him to assist the pupil who is trying to solve a difficult problem, by the asking of leading or suggestive questions or by a simplification of the situation. Such methods are out of place in the giving of a standard test. For the duration of the examination the teacher ceases to teach and merely acts to provide a situation to which each child will respond as his abilities enable him to respond. This situation must be the same for all children, and to this end the teacher must restrain his tendency to help weak pupils or to simplify the tests more than the printed directions already do. *The directions must be naturally but rigidly followed.*

2. Practice in Testing

Every examiner should have preliminary practice in giving the tests before attempting to examine a class. Well-trained teachers, supervisors, or superintendents, not trained in giving tests, will show peculiar variations in methods of work in their early efforts, and these variations may make significant differences in results. Practice should be continued until variations in method are reduced to a minimum. If a group of teachers will practice giving the tests to small groups of pupils under criticism of each other or of a principal, supervisor, or superintendent, they will soon attain a fair uniformity.

III. GENERAL DIRECTIONS

To assist those who have had little experience in giving tests, the following general directions are offered, in order that the results of the tests may be comparable with similar results obtained elsewhere. Specific directions for each part of the test are given below.

(1) *Quiet room.* The examination should be given in a room free from distracting noises within or without. Preferably only the examiner and the pupils should be present.

(2) *Clear desks.* Have all books, papers, and other materials removed from the tops of the desks.

(3) *Sharp pencils.* Have the pupils use pencils in all tests. Each pupil should have two sharpened pencils with which to begin, and the examiner should keep a supply of sharpened pencils for emergencies.

(4) *Distribution of materials.* The examiner should remain at the front of the room during the examination. He should not distribute materials himself. He should lay bundles of papers on the desks of pupils in the front seats, and these pupils should distribute them.

(5) *Examiner's manner.* The examiner's manner should be pleasant and such as to set the pupils at ease at the start. He should speak distinctly, in a moderate voice, and should avoid anything that would distract the attention of pupils from the work. He should proceed promptly, so as to keep pupils alert, but should avoid excitement. The examinations can be successfully given only when the children are attentive and interested. Go about your work in a businesslike way. Do not hurry, but do not waste time. Children naturally like these tests, and any failure on their part to respond in a proper manner will usually be due to tactlessness on the part of the examiner.

(6) *Giving directions.* The directions are meant to be so explicit that all children will understand exactly what to do when the signal to write is given. In order to maintain uniform conditions in giving the tests, do not entertain any questions from pupils once the test is begun. Read and speak all directions slowly and distinctly, so that every child will understand clearly what he is to do, but do not repeat if the instructions do not so direct. Avoid all impromptu directions, since such variations in the method may modify the results.

(7) *Keeping time.* The results of the examinations will be valueless unless the time is kept accurately. A good watch having a second hand is sufficiently accurate if the examiner is skillful in starting and stopping the pupils on the exact second. This is exceedingly important.

In starting a test be sure that all pupils are at "Attention" before giving the starting signal. Start each test with the second hand of your watch at 60 or zero. Watch the time accurately and speak the word "Stop" in a pleasant but decisive tone, so that all pupils will stop work at the same time. If by chance you make any mistake in timing the test, note that fact, so that account may be taken of it when the tests are scored.

(8) *Copying.* It is absolutely necessary that copying be prevented. This kind of unfairness is especially likely to occur where two or more children occupy the same desk

or where the aisles between desks are narrow. Where the conditions are not favorable for work, the examiner should not hesitate to reseat pupils, nor to call to attention quietly but firmly any pupil caught copying. The papers of such children should be marked so as not to be counted in the scoring of the class.

(9) *Unreliable papers.* In some classes papers of certain pupils will be rendered unreliable by the breaking of a pencil point, by children leaving the room, or by other variations. All such papers should be marked so that they will not be counted in a group score.

IV. DIRECTIONS FOR GIVING THE TEST

(1) The examiner will explain to the pupils that a new test is to be given. He will hold up a copy of the test, with the front page to the class, and say, **" The tests are in these little books. We shall now distribute them with this side up** (indicating front page). **Do not turn them over or open them until I tell you to do so."**

(2) Have monitors distribute the tests as indicated.

(3) When the tests have been distributed, the examiner will instruct the pupils to fill in the blanks at the top of the first page. In case the name is all the information needed, the other blanks may be ignored. In the upper grades the pupils will supply the needed data without detailed instructions.

Where the detailed information is desired, the following instructions may be used:

a. **" On this page** (pointing to the front page of the booklet) **there are certain blanks to fill in. Look at the first one and write your first and last names.** (Pause.)

b. **" On the same line read, ' I am a .....' Write the word ' Boy,' if you are a boy. If you are a girl, write the word ' Girl.'** (Pause.)

c. **" On the next line it says: ' This is the ..... day of ..... 19..' Write in the day and the name of the month.** (Examiner will give the correct data.) (Pause.)

d. **" On the same line tell how old you are.** (Pause.)

e. **" Now look at the next line. ' My next birthday will be .....' Write the month, day, and year.** (Pause.)

f. **" Look at the next sentence: ' I am in ..... half of Grade .....' In the first blank write the word ' First ' if you are in the first half grade; write the word ' Second ' if you are in the second half grade.** (Pause.) **In the second blank write the figure showing which grade you are in.** (Pause.)

g. **" Now look at the next line and write the name of your school.** (Pause.) **On the same line write the name of your city (county).** (Pause.)

h. **" On the last line write the name of your state."** (Pause.)

(4) When the blanks have been satisfactorily filled in, the examiner will read the instructions aloud while the pupils read them silently.

He will proceed as follows, reading slowly:

" Read the instructions on this page with me. ' This little book contains some exercises which will show how well you can do certain things. Some of the things are very easy, and some are very hard. There are six exercises in all. You will be shown them one at a time and will finish each one before you see the next one. Do not turn any page until you are told to do so. As soon as you turn the page, lift your pencil, with your elbow on your desk, and do not put your pencil down until we have read the instructions and until I say " Go! " Now turn the page to Exercise 1.'

EXERCISE 1. SENTENCE READING

" Attention! Attention always means to hold your pencil like this (examiner demonstrating), **with elbow on desk and with eyes looking straight at me. Now look at the directions at the top of the page as I read them.**

" ' Read this question: Do cats see?..... No Yes. The right answer is Yes; so a line is drawn under Yes.

" ' Read the next question: Is coal white?.....No Yes. The right answer is No; so a line is drawn under No.

" ' Below are a great many more questions. Read them carefully, one at a time, and draw a line under the right answer. When you are not sure, guess.' You will have 4 minutes to work. Ready! Go! "

Allow exactly 4 minutes and then say **" Stop! Turn over the page to Exercise 2.**

EXERCISE 2. ARITHMETICAL PROBLEMS

" Attention! Look at the directions at the top of the page while I read them. ' Get the answers to these problems as quickly as you can. Use the side of this page (exhibiting) **to figure on if you need to.' I shall say ' Stop! ' at the end of 5 minutes. You may not be able to finish all of them, but do as many as you can in the time allowed. The first two are already answered correctly. Ready! Go! "**

Allow exactly 5 minutes and then say **" Stop! Turn over the page to Exercise 3.**

EXERCISE 3. PICTURE COMPLETION

" This is Exercise 3 here (examiner holds up page) **— a lot of pictures. Let us read what it says: ' Each of these pictures has something missing, and you are to put in with your pencil the missing part. Look at the first one. It is the picture of a boy's face, but it has no mouth. Now with your pencil mark in a mouth. The woman has no eye. Give her an eye. The other pictures are to be finished in the same way.'**

" Attention! When I say 'Go,' begin at No. 1 and mark in each picture the part that is missing. Ready! Go! "

Allow exactly 3 minutes and then say **" Stop! Now turn your book around to Exercise 4.** (Examiner illustrates necessary rotation.)

EXERCISE 4. SYNONYM–ANTONYM

"Attention! Look at the directions at the top of the page while I read them. (Examiner reads slowly.)

" 'Look at these two words:

little — small same — opposite

" 'They mean the same thing, so a line is drawn under same.

good — bad same — opposite

" 'These two words do not mean the same; they mean just the opposite; so a line is drawn under opposite.

" 'Now look at all the other words on this page. If the words of a pair mean the same or nearly the same, draw a line under same. If they mean the opposite or nearly the opposite, draw a line under opposite. If you cannot be sure, guess.'

" Ready! Go! "

After 2 minutes say **" Stop! Turn over the page to Exercise 5.**

EXERCISE 5. PRACTICAL JUDGMENT

" Attention! Look at the directions at the top of the page while I read them. (Examiner reads slowly and carefully.) **'This is a test of common sense. Below are sixteen questions. Three answers are given to each question. You are to look at the answers carefully; then make a cross in the square before the best answer to each question, as in the sample:**

Why do we use stoves? Because

☐ they look well
☒ they keep us warm
☐ they are black

" 'Here the second answer is the best one and is marked with a cross. Begin with No. 1 and keep on until time is called.' Ready! Go! "

After 2 minutes say **" Stop! Turn over the page to Exercise 6.**

EXERCISE 6. INFORMATION

" Attention! Look at the directions at the top of the page while I read them. (Examiner reads slowly.) **'Look at this sentence: People hear with the eyes — ears — nose — mouth. The correct word is " ears," because it makes the truest sentence. In each of the sentences below you have four choices for the last word. Only one of them is correct. In each sentence draw a line under the one of these four words that makes the truest sentence. If you cannot be sure, guess. The first one is already marked as it should be.' Ready! Go! "**

After 4 minutes say **" Stop! "**

Have all booklets and other materials collected at once.

V. DIRECTIONS FOR SCORING AND RECORDING

1. General Rules

(1) Each item of each exercise is scored either right or wrong. No part credits are given.

(2) In general, items evidently corrected by the pupil stand as corrected.

(3) Before beginning the scoring of each exercise, indicate the last item of the test attempted by drawing a long line under that item and out into the margin of the page.

(4) In tests where the score is " number right," make a check (√) after each wrong and omitted item. The number of checks subtracted from the number of the last item attempted gives the score.

(5) In Tests 1 and 4 (scored right *minus* wrong), make a check (√) after each wrong item and an O after each omitted item.

(6) Enter the score for each test in the lower right-hand corner of the test page and encircle it. When the test has been rescored, a check mark may be made beside the circle.

(7) Use colored pencil, because it increases accuracy of scoring.

(8) The scoring key must be used for scoring all exercises.

EXERCISE 1

(1) Place key for Exercise 1 in position as indicated on the key and make a check after each wrong item and an O after each omitted item.

(2) The score is number right *minus* number wrong. A quick method is to subtract twice the " wrongs " from the " attempts." *Do not figure the score as attempts minus wrongs.*

(3) Any clear method of indicating answer is given credit.

(4) When both " No " and " Yes " are underlined, count as omitted, not as wrong. Items so omitted are considered not attempted.

(5) If only " Noes " are underlined right down the column, the score is zero; similarly if only " Yeses " are so underlined. Papers which give evidence of alternate responses are marked zero.

EXERCISE 2

(1) Place the edge of the key for Exercise 2 next to the column of answers and make a check (√) after each wrong and omitted item.

(2) Score is number right. The number of checks subtracted from the number of the last item attempted gives the score.

(3) Answer may be written on dotted line or elsewhere near its problem.

(4) If two answers are given to any problem, count as wrong.

(5) If it seems clear that, by a slip, one answer has been put in the wrong brackets, and the next answers are all thus misplaced, give credit for the answers that are right even if misplaced.

(6) Omission of dollar sign is permissible.

(7) Omission of decimal point is permissible in Items 2, 11, and 16. Fraction may be expressed as decimal in Item 18.

(8) Abstract numbers are to be considered right.

EXERCISE 3

(1) In the key for this exercise, the missing parts are shown in red.

(2) Score is number right, not including first two items, which are samples.

(3) Rules for individual items:

Item 2. Any spoon at any angle *in right hand* receives credit. Left hand, or unattached spoon, no credit.

Item 3. Any mark indicating a handle to pot counts right. In the key two kinds of handles have been drawn in red. Either kind scores right.

Item 4. Only an ear on side opposite the intact ear receives credit.

Item 5. Marks indicating the missing jaw are to be counted right.

Item 6. Drawing indicating strings, even though not of the correct length, receives credit; nothing else receives credit.

Item 7. Square, cross, etc., between date mark and upper right-hand corner receive credit. All others wrong.

Item 8. Any marks to indicate missing block count right.

Item 9. Mark to indicate trigger of pistol right.

Item 10. Chimney must be in right place. No credit for smoke.

Item 11. Stock in the right hand in any position counts right.

Item 12. Any marks connecting ink blot with neck of bottle right.

Item 13. Only marks clearly indicating tracks between last track and feet of boy score right.

Item 14. Handle of umbrella to hands of child counts right. Handle in any other position does not count.

Item 15. Mark indicating food in bill of mother bird.

Item 16. Hand and powder puff must be put on proper side in the image. (Left hand of lady is the right hand of her image.)

Item 17. Line indicating long hand of clock and placed between I and IV scores right. Any other marks wrong.

Item 18. Zero placed to left of column of mercury at midpoint between 20 and 20.

Item 19. Any marks indicating shadow of cat on right.

Item 20. Any marks to indicate steam issuing from spout of kettle.

EXERCISE 4

(1) Place key for Exercise 4 in position as indicated and make a check after each wrong item and an O after each omitted item.

(2) Score is rights *minus* wrongs (see Exercise 1 above).

(3) Any clear method of indicating answer is given credit.

(4) When both "Same" and "Opposite" are underlined, count as omitted, not as wrong.

(5) If only "Sames" are underlined right down the column, the score is zero; similarly, if only "Opposites" are so underlined. Papers which give evidence of alternate responses are marked zero.

EXERCISE 5

(1) Place key for Exercise 5 in position as indicated and make a check after each wrong or omitted item.

(2) Score is number right.

(3) Any clear method of indicating answer is given full credit — underlining, checking, etc.

(4) If two answers are marked, count as wrong unless one is clearly indicated as final.

EXERCISE 6

(1) Place key for Exercise 6 in position and make a check after each wrong and omitted item.

(2) Score is number right.

(3) Any clear indication other than underlining receives full credit.

(4) If two or more of the last four words are marked, give no credit.

(5) Underlining of any of the first three words of an item does not in itself remove credit.

2. Total Score

Total score is the sum of the scores made on the several parts of the test. The following table indicates the method of scoring and the maximum score:

TABLE 1

Test	Method of Scoring	Maximum Raw Score
1	Rights − Wrongs	40
2	Rights	20
3	Rights	20
4	Rights − Wrongs	40
5	Rights	16
6	Rights	40
Total		176

3. Class Record Sheet

Record names and scores on the Class Record Sheet. The data for the two columns headed "Nearest Standard Score, Grade and Age," are to be obtained from Tables 2

and 3. In completing the other blanks on the sheet, observe the following directions: (1) Under "Age" give the exact present age in years and months. (2) "Years in School." Write 3, 3½, 4, 4½, 5, 5½, etc., to indicate the exact length of the time pupil has been in school, from the time he first entered any school to the date of the examination.

4. Qualities

a. **Scholarship.** If a pupil is average in his school studies, mark him *C*. If he is as good as the best 5 per cent of children you have known in the public schools, mark him *A*. If he is better than the poorest 75 per cent of the public school children you know, but not so good as the best 5 per cent, mark him *B*. If he is poorer than the best 75 per cent — i.e., poorer than the middle 50 per cent, but not so poor as the poorest 5 per cent, — mark him *D*. If he is as poor as the poorest 5 per cent, mark him *E*. Proceed similarly with every other child.

b. **Intelligence.** In scoring pupils for intelligence, think of the skill with which they are able to meet new situations, both in school and out. The most intelligent pupil does not always make the highest marks in school, nor is the pupil with the highest marks the most intelligent child. Industry, good health, regular attendance, and other school conditions are important factors in school success. Proceed in estimating the intelligence by the same method as was used in estimating scholarship, scoring each pupil *A*, *B*, *C*, *D*, or *E*, as indicated.

c. **Industry.** In rating a pupil for industry consider his ability to apply himself to his school work, both in school and out, to learning his lessons, and to doing other set tasks, so far as this may be known to you. Proceed as in the case of scholarship and intelligence and score each pupil *A*, *B*, *C*, *D*, or *E*, as indicated.

Keep in mind that

A means superior, about the score of the best 5 per cent of children of that race and age.

B means high average, above the average, but not so good as *A*. The next best 20 per cent of the children make this score.

C means average, the score of the middle 50 per cent of that race and age.

D, low average, means below the best 75 per cent of school children of that race and age; i.e., below the middle 50 per cent, but not so poor as the lowest 5 per cent.

E means inferior, about the score of the poorest 5 per cent of the children of that race and age.

5. Median Score

It will sometimes be helpful to compute the median score for the class either in the "total score" or for each test separately. To obtain the median score for a small group, arrange the scores in the order of magnitude from the highest score to the lowest score. Then count up the middle score. This middle score is the median of the group.

VI. NORMS

Tables 2 and 3 give the grade and age norms based on about 40,000 children.

TABLE 2

Revised Grade Norms in Intelligence Examination: Delta 2

Grade	3	4	5	6	7	8	9
Score	40	64	83	101	112	120	130

TABLE 3

Revised Age Norms for Intelligence Examination: Delta 2

	Month											
Year	0	1	2	3	4	5	6	7	8	9	10	11
7	7	9	10	12	13	15	16	18	19	21	22	24
8	25	27	28	30	31	32	35	37	38	40	42	43
9	45	46	47	48	49	50	52	53	54	55	56	57
10	58	59	60	61	62	63	64	65	66	67	68	69
11	70	71	72	73	74	75	76	77	78	79	80	81
12	82	83	84	85	86	87	88	89	90	91	92	93
13	94	95	96	97	98	99	100	100	101	102	103	104
14	105	106	107	108	109	110	110	111	112	113	114	115
15	116	117	118	118	119	120	121	121	122	123	124	124
16	125	126	126	127	128	128	129	130	130	131	132	132
17	133	134	134	135	135	136	136	137	137	138	138	139
18	139	140	140	141	141	142	142	143	143	144	144	145
19	145	146	146	146	147	147	148	148	148	149	149	150

If an eleven-year-old child scores 83, he is normal for the fifth grade. If, however, he scores 101, he is of sixth-grade ability, and his score has added significance because it is considerably above the median for his age.

The norm for 7 years, 0 months, is 7 points; for 7 years, 1 month, is 9 points, etc.

VII. HOW TO USE RESULTS OF TESTS

1. For Grouping of Pupils

One of the functions of standard tests is to indicate the proper grouping of children in the school. However, the feasibility of placing children where the test indicates they should go depends on the available facilities.

Two general types of classes in addition to the regular grades are becoming common in American schools. The first and the one of longest standing is the class for retarded children. Such classes are of various levels, from those for feeble-minded to "opportunity classes" designed for normal pupils who have fallen behind because of illness, absence, or other reason. Every school system with an enrollment of 300 pupils should have one or more such classes. Backward and defective children should be grouped and placed in the hands of a teacher

trained specifically for teaching such pupils. Where classes of this type are already in existence, it is a simple matter to transfer to such a class a pupil who the tests indicate will not profit by the work of the regular class.

More recently classes for superior children have appeared in some schools, called " rapid progress classes." American schools have as yet had but little experience in training superior children as a class, but indications point to a considerable extension of the special class to meet the situation. Such classes should probably be organized as early as the fourth grade. The probable members of such a class can be determined at this time, if not earlier, and they can then cover the remaining portion of the elementary school course at a rapid rate but without skipping important parts of the upper-grade work. In order that the brightest pupils should not graduate at too early an age, the curriculum for them should be enriched. The teacher of a superior class is in need of special preparation, in order that he may make the best possible use of the children's time.

From the positive social point of view the average and superior children are most important. The great bulk of the world's work is done by persons of average capacity, and these pupils should be taught as effectively as possible. Most of the leaders of the next generation are among the small per cent of superior pupils now in the schools. They should be discovered and set upon the road of rapid progress. They have far to go because their training must be extensive. They will arrive none too early, for active participation in the world's affairs will stop short their educational careers if too prolonged.

Another solution for the misgrouping of children is double promotion of distinctly superior children in the lower and middle grades. Such children quickly adjust themselves to new conditions and in some cases are soon ready to repeat the process. Skipping in the upper grades, particularly the seventh, is of more doubtful expediency, although it is sometimes to be preferred to the lockstep which dulls interest. Skipping the eighth grade is probably a less serious matter. The important point to be kept in mind always is to be assured that the child's abilities warrant the move.

It is by no means certain that skipping or rapid progress in a special group is the proper solution of the education of the superior child. Physical and social qualities may or may not keep pace with the growth of intellect. It is possible for rapid mental development to be utilized by the enrichment of the course of study while the child is allowed to remain in the same social group. The best discussion of the matter will be found in H. H. Goddard's *School Training of Gifted Children* [1] and Leta S. Hollingworth's *Gifted Children*.[2]

[1] Published by World Book Company, Yonkers-on-Hudson, New York; 1928.
[2] The Macmillan Company, New York; 1926.

The one distinct step in advance is the increase in the reliability of our measuring scales and their adaptation to group methods, to the end that we can measure all the children in the school.

Demoting children should be avoided both because of parental objection and because it is so likely to dull the edge of effort. If the use of intelligence tests is begun sufficiently early in the child's career, demotion will not be necessary. The pupil will not only be saved the chagrin of being grouped with his intellectual superiors, but the instruction which he gets will be better adapted to his needs. Progress will be actually more rapid than if he is dragged along in a class more able than he is.

In some cases conditions may make a regrouping of an entire class or school advisable. In that event, the general intelligence of pupils coupled with their industry is probably a good basis of classification. The best arrangement is probably a flexible grouping system which places children in a class group on the basis of their general intelligence and then allows a regrouping for the teaching of the different subjects.

2. Caution

A caution should be urged against basing administrative action too exclusively on test scores. There is always the possibility that the child for some reason did not do himself full justice in the test. Cases of this sort are more likely to remain undetected in group testing than where an individual is examined alone. The test results should be interpreted in the light of all the supplementary information called for on the Class Record Sheet. In the few cases where there is clear disagreement between the test results and other data, the test may be repeated, or an individual test may be given. This can be done with either the Stanford or Herring Revision of the Binet Tests, or some other series of well-standardized tests.

The tests are not a substitute for common sense on the part of a teacher or superintendent. The educational examiner must use the test results to supplement, correct, or reinforce his observations. So used they will add greatly to intelligent treatment of school problems.

The test will be of greatest value for the very dull and very bright pupils. Teachers generally overrate dull pupils and tend to promote them to work they cannot do. They tend to underrate superior children and to keep them from advancing as rapidly as they should. A class is most easily instructed when the pupils are properly classified — that is, are of the same grade of development. Dull children should learn tasks they can perform, and superior children should be released from the lockstep of a rigid grading system and set free for their most effective development.

Haggerty Intelligence Examination

DELTA 1

FOR GRADES 1–3

Arranged and standardized by M. E. Haggerty, University of Minnesota

MANUAL OF DIRECTIONS

CONTENTS

		PAGE
I.	When Are Intelligence Tests Satisfactory? . 1. Discriminative Capacity — 2. Reliability — 3. Significance	1
II.	Who Can Give Intelligence Tests? . . . . 1. Teaching and Testing — 2. Practice in Testing	2
III.	General Directions	3
IV.	Directions for Giving	4
V.	Directions for Scoring and Recording . . . 1. Total Score — 2. Class Record Sheet — 3. Qualities — 4. Median Score	6
VI.	Norms	7
VII.	How to Use Results of Tests . . . . . 1. For Grouping of Pupils — 2. Caution	8

I. WHEN ARE INTELLIGENCE TESTS SATISFACTORY?

Tests should meet certain statistical criteria if the results secured from them are to be usable for diagnostic and administrative purposes. The most important of these are discussed here for the guidance of school officers in selecting the tests which they will use. Data are presented showing the extent to which the Haggerty Intelligence Examination meets these requirements.

1. Discriminative Capacity

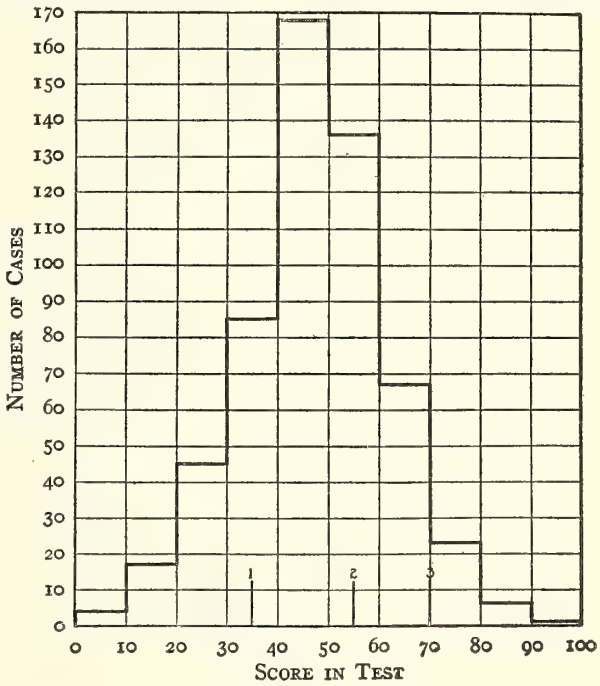
Every test should serve to distinguish one individual from another and to discriminate the individuals of a group so that each is properly placed in his relative position as regards the trait which is measured. If one individual has a certain amount of intelligence, and another has enough more of the same trait to make a real difference between the two individuals, then the test must show this difference properly. This means that the units in which the test measures must be sufficiently small to measure all significant differences and that the range of the test from low score to high score must be great enough to measure extreme cases, whether these extreme cases have much or little of the trait in question.

More specifically, discriminative capacity means two things: First, that the size of the measuring units is adequate for the measurement of significant differences; and second, that a group of persons selected at random will distribute themselves along a scale, with few or no individuals making zero scores, a very large number of individuals making average scores, and a small number or no individuals making perfect scores.

The figure below, which gives the surface of frequency for a group of persons measured by the Haggerty Intelligence Examination: Delta 1, shows that it has adequate discriminative capacity.

Frequency Distribution for Haggerty Intelligence Examination: Delta 1 — 552 Cases in Grade 2

(Verticals numbered 1, 2, and 3 indicate medians for corresponding grades.)



An examination that is to be useful in school measurement should show two additional criteria. First, each school grade or half-grade should show a median score higher than the median score of the grade or half-grade next below, and the intergrade steps should be definitely determinable. In how far the test meets this require-

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HIE: DELTA 1: MD–1

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ment may be seen from the tables of standard grade scores, page 8. Second, the median deviation from the central tendency shown in the test should not be large in the case of any well-graded class. As a satisfactory measure for the classification of school children the median deviation should not exceed the increase of scores shown from one grade median to that of the next grade above.

A test, then, has satisfactory discriminative capacity when it measures individuals in sufficiently definite units properly to represent their actual traits, when it shows large groupings near a midpoint on a series of measures, when it shows few zero and few perfect scores, when it shows definite and clearly distinguishable inter-grade steps, and when the median deviation for any well-grouped class is small. The test described here meets these requirements in a highly satisfactory degree.

2. Reliability

About any test which can be given, whether it be an achievement test or an intelligence examination, there is a certain unreliability. By this is meant that if the test were given again to the same pupils, certain of them would score higher and others would score lower. This unreliability inheres also in teachers' judgments and, in a theoretical sense, in every measurement that can be made, whether that measurement be of human capacities or of physical facts. Science has found no way to eliminate this unreliability, but has devised ways of measuring it and of compensating for its presence. In the use of intelligence or achievement tests the fact of unreliability must be carefully considered if conclusions regarding overlapping, inaccurate classification, or school progress are to be dependable.

Obviously a satisfactory test should give the same result each time it is used. The score from a test which gives one result one day and a different result when the test is repeated or a similar one given, is undependable. No important inference can be made from a score so obtained and no practical procedure can be based upon it, since a retrial might invalidate such inference or procedure altogether.

An important method for determining the reliability of the test is to repeat the test and to calculate the correlation between the results of the first trial and those of the second. If this correlation is high, it may be inferred that the test is reliable and that the score which an individual makes the first time is a fair index of what he will do on repeated trials.

The Haggerty Intelligence Examination: Delta 1, has been subjected to this method of determining reliability. On one occasion it was given to more than 100 pupils in Grades 1A to 2A inclusive. The same test was given to these pupils about six weeks later. The correlation between the standing of the pupils in the two tests was .787 (Pearson). The average increase in score was about 8.55 points. Considering the small range of ability represented by this narrow selection of grades, this coefficient of correlation has a very substantial character and indicates a high reliability for the test.

3. Significance

It has been found that the so-called "cancellation tests" give no results that are worth while. The ability to cancel certain figures or letters on a page is not in itself of much importance, and success in this activity does not indicate the possession of any other desirable trait. On the other hand, a high score in an opposites test indicates the possession of important mental abilities other than the ones tested. To be significant an examination must have a content which is in itself a desirable possession for an individual, or success in the examination must give a dependable basis for inferring the possession of desirable traits not directly measured. Thus, from the score which a pupil makes in an intelligence test it should be possible to infer that pupil's capacity to do school work. The statistical method for determining the significance of a test is that of determining the coefficient of correlation between the test and other admittedly significant measures of capacity or achievement. If such coefficients are high, the test is in so far significant, but low coefficients of correlation show low significance or none.

Numerous correlations have been computed for the Haggerty Intelligence Examination: Delta 1. All of these point to the fact that this examination is a good measure of general intelligence. Correlations with narrowly selected groups such as occur in Grades 1A to 3C range in the 60's and 70's. With a criterion composed of grade location and teacher's rating for intelligence, the examination gives in Grades 1 to 3 a coefficient of .67. In the case of 144 eight-year-olds, the Haggerty Intelligence Examination: Delta 1 correlated with the Haggerty Reading Examination: Sigma 1, .64. These two tests combined for 200 children showed with the criterion named above a correlation of .84. All of these figures indicate that this test has great value as a means of investigating young children with a view to their school progress.

II. WHO CAN GIVE INTELLIGENCE TESTS?

Teachers will not have an adequate appreciation of the significance of intelligence or of the part it plays in the education of children until they learn to give intelligence examinations and to interpret the results of the tests. They should learn through actual experience in giving

and scoring tests how great the differences in intelligence among children of the same age really are. Only when they deal with concrete cases measured in definite terms will they be able to direct their school work so as to secure the best results. It is fortunate that in the development of methods of intelligence testing we have arrived at the place where a good teacher can safely give the tests. The development of group methods enables her to do this for all the children who come under her direction.

The average teacher, however, cannot make an adequate psychological diagnosis of complicated and difficult cases. Such children should have the services of an expert psychologist. The point to be urged here is that an intelligent teacher can be quickly taught how to give and score intelligence tests. In almost any school system there is some teacher, principal, or supervisor who has had sufficient training in normal school or college to enable him to follow the directions here given. Such a person can be used to train others, and with proper perseverance and precautions an entire corps can be taught to do the work.

1. Teaching and Testing

For the duration of the examination the teacher ceases to teach and merely acts to provide a situation to which each child will respond as his abilities enable him to respond. This situation must be the same for all children, and to this end the teacher must restrain his tendency to help weak pupils or to simplify the tests more than the printed directions already do. *The directions must be naturally but rigidly followed.*

2. Practice in Testing

Every examiner should have preliminary practice in giving the tests before attempting to examine a class. Well-trained teachers, supervisors, or superintendents, not trained in giving tests, will show peculiar variations in methods of work in their early efforts, and these variations may make significant differences in results. Practice should be continued until variations in method are reduced to a minimum. If a group of teachers will practice giving the tests to small groups of pupils under criticism of each other or of a principal, supervisor, or superintendent, they will soon attain a fair uniformity.

III. GENERAL DIRECTIONS

To assist those who have had little experience in giving tests, the following general directions are offered, in order that the results of the tests may be comparable with similar results obtained elsewhere. Specific directions for each part of the test are given below.

(1) *Quiet room.* The examination should be given in a room free from distracting noises within or without. Preferably only examiner and pupils should be present.

(2) *Clear desks.* Have all books, papers, and other materials removed from the tops of the desks.

(3) *Sharp pencils.* Pupils should use pencil in all tests. Each pupil should have two sharpened pencils with which to begin. Keep a supply of sharpened pencils for emergencies.

(4) *Distribution of materials.* Remain at the front of the room during the examination. Do not distribute materials, but lay bundles of papers on the desks of pupils in the front seats. The pupils should distribute them.

(5) *Examiner's manner.* The examiner's manner should be pleasant and such as to set the pupils at ease at the start. He should speak distinctly, in a moderate voice, and should avoid anything that would distract the attention of pupils from the work. He should proceed promptly, so as to keep pupils alert, but should avoid excitement. The examinations can be successfully given only when the children are attentive and interested. Go about your work in a businesslike way. Do not hurry, but do not waste time. Children naturally like the tests. Failure on their part to respond properly will usually be due to the examiner's tactlessness.

(6) *Giving directions.* The directions are meant to be so explicit that all children will understand exactly what to do when the signal to write is given. In order to maintain uniform conditions in giving the test, do not entertain any questions from pupils once the test is begun. Read and speak all directions slowly and distinctly, so that every child will understand clearly what he is to do, but do not repeat if the instructions do not so direct. Avoid all impromptu directions, since such variations in the method may modify the results.

(7) *Keeping time.* The results of the examinations will be valueless unless the time is kept accurately. A good watch having a second hand is sufficiently accurate if the examiner is skillful in starting and stopping the pupils on the exact second. This is exceedingly important.

In starting a test be sure that all pupils are at "Attention" before giving the starting signal. Start each test with the second hand of your watch at 60 or zero. Watch the time accurately and speak the word "Stop" in a pleasant but decisive tone, so that all pupils will stop work at the same time. If by chance you make any mistake in timing the test, note that fact, so that account may be taken of it when the tests are scored.

(8) *Copying.* It is absolutely necessary that copying be prevented. This kind of unfairness is especially likely to occur where two or more children occupy the same desk or where the aisles between desks are narrow. Where the conditions are not favorable for work, the examiner should not hesitate to reseat pupils, nor to call to attention quietly but firmly any pupil caught copying. The papers of such children should be marked so as not to be counted in the scoring of the class.

(9) *Unreliable papers.* In some classes papers of certain pupils will be rendered unreliable by the breaking of a pencil point, by children leaving the room, or by other variations. All such papers should be marked so that they will not be counted in a group score.

IV. DIRECTIONS FOR GIVING

(1) This examination consists of 6 tests, with a "fore-exercise" for each test. The fore-exercises are printed as Exercises 1, 3, 5, 7, 9, and 11; the tests proper, as Exercises 2, 4, 6, 8, 10, and 12.

(2) The fore-exercise is intended in each case to serve two purposes: (*a*) to afford opportunity for giving preliminary instruction in the method of performing the real test, and (*b*) to give all pupils some practice in the test in order to equalize the preliminary experiences of the children with the test.

(3) The tests are arranged in such a fashion that the fore-exercise can be given without the test proper being exposed. All instructions regarding methods of procedure are to be given in connection with the fore-exercise, and when the pupil turns the page to the real exercise *all instruction by the examiner ceases and no questions from pupils are to be entertained.* The directions for each exercise should be followed explicitly.

(4) When the tests are distributed, the examiner will instruct the pupils to fill in the blanks at the top of the first page. If only the name is needed, ignore the other blanks. If detailed information is desired in the lower grades, the following instructions may be used:

a. **"On this page** (pointing to the front page of the booklet) **there are certain blanks to fill in. Look at the first one and write your first and last names.** (Pause.)

b. **"On the same line read, 'I am a .....' Write the word 'Boy,' if you are a boy. If you are a girl, write the word 'Girl.'** (Pause.)

c. **"On the next line it says: 'This is the ..... day of ..... 19...' Write in the day, the name of the month, and the year.** (Give the correct date.) (Pause.)

d. **"On the same line tell how old you are.** (Pause.)

e. **"Now look at the next line. 'My next birthday will be .....' Write the month, day, and year.** (Pause.)

f. **"Look at the next sentence: 'I am in ..... half of Grade .....' In the first blank write the word 'First' if you are in the first half grade; write the word 'Second' if you are in the second half grade.** (Pause.) **In the second blank write the figure showing which grade you are in.** (Pause.)

g. **"Now look at the next line and write the name of your school.** (Pause.) **On the same line write the name of your city (county).** (Pause.)

h. **"On the last line write the name of your state.** (Pause.)

EXERCISE 1. ORAL DIRECTIONS (*Fore-exercise*)

"Lay your pencils down until I say *Ready!* With this little book we are going to play some interesting games. You must look straight at me and do just what I tell you to do. Do not turn over any page until I tell you to do so." All directions should be read slowly.

(1) **"Put your finger on 1. See the lines? See the letters A and B at the top? Look at me.** (Examiner holds book before the class with finger pointing to the incomplete square.) **When I say *Go,* draw a line from the letter A to the letter B. Ready! Go!** (5 seconds.) **Pencils down.**

(2) **"Put your finger on 2. See the apple?"** Examiner goes to board and makes a cross like the letter X and says, **"Here is the way to make a cross. Look at me. When I say *Go,* make a cross on the apple. Ready! Go!** (5 seconds.) **Pencils down.**

(3) **"Put your finger on 3. See the big A? Look at me. When I say *Go,* draw a ring around the letter A. Ready! Go!** (5 seconds.) **Pencils down.**

(4) **"Put your finger on 4. See the ring? Look at me. When I say *Go,* put a figure 3 inside the ring. Ready! Go!** (5 seconds.) **Pencils down.**

(5) **"When I say *Turn,* you are to turn the page. There you will find a whole page of pictures. Do not make any marks on any picture until I tell you to do so. Ready! Turn!**

EXERCISE 2. ORAL DIRECTIONS

(1) **"Put your finger on 1. See the mouse? Look at me. When I say *Go,* draw a ring around the mouse. Ready! Go!** (3 seconds.) **Pencils down.**

(2) **"Put your finger on 2. See the letters A and B? Look at me. When I say *Go,* draw a line from the letter A to the letter B. Ready! Go!** (3 seconds.) **Pencils down.**

(3) **"Put your finger on 3. See the letters A and B? Look at me. When I say *Go,* draw a line from the letter A to the point at B. Ready! Go!** (3 seconds.) **Pencils down.**

(4) **"Put your finger on 4. See the big figure 1? Look at me. When I say *Go,* make two zeros after the 1. Ready! Go!** (3 seconds.) **Pencils down.**

(5) **"Put your finger on 5. See the big ring? Look at me. When I say *Go,* make a ring around the letter X and another around the letter O. Ready! Go!** (5 seconds.) **Pencils down.**

(6) **"Put your finger on 6. Look at me. When I say *Go,* draw a line from A to B that will pass through C. Ready! Go!** (5 seconds.) **Pencils down.**

(7) **"Put your finger on 7. Look at me. When I say *Go,* write a letter B on the ball, a letter G on the girl, and a letter F on the fish. Ready! Go!** (8 seconds.) **Pencils down.**

(8) **" Put your finger on 8. Look at me. When I say *Go*, make a figure 2 on the chick, a figure 4 on the dog, and a figure 6 on the bug. Ready! Go!** (10 seconds.) **Pencils down.**

(9) **" Put your finger on 9. Look at me. When I say *Go*, if the bee comes after the rabbit put a cross on the rabbit; if not, put a cross on the squirrel. Ready! Go!** (10 seconds.) **Pencils down.**

(10) **"Put your finger on 10. Look at me. When I say *Go*, if a pig is larger than an elephant put a cross in the last square; but if not, put a cross in the first square. Ready! Go!** (10 seconds.) **Pencils down. Now turn the page to Exercise 3."**

When giving the direction " Look at me," make sure that every pupil is looking at the examiner before the critical direction is given.

EXERCISE 3. COPYING DESIGNS (*Fore-exercise*)

(1) **" Put your finger on 1. Look at the straight line from A to B. When I say *Go*, make one just like it. Make it by drawing a line from the letter C to the letter D. Ready! Go!** (5 seconds.) **Pencils down.**

(2) **" Put your finger on 2. Now look at the ring. When I say *Go*, you are to make one just like the one you see. Make it by drawing around the big letter A. Ready! Go!** (5 seconds.) **Pencils down.**

(3) **" Put your finger on 3. Now look at all the rest of the lines on the page and copy each one in the space beside it. Work as carefully and as fast as you can. Ready! Go!"**

Allow 30 seconds and then say, **" Pencils down. Turn over the page to Exercise 4.**

EXERCISE 4. COPYING DESIGNS

" When I say *Go*, begin at the first picture here (Point to the first picture) **and copy just as many of these pictures as you can right down the page. Then make the next row, beginning here** (Point to picture at 6). **Make yours just like the one you see here. Ready! Go!"**

Allow 2 minutes and then say, **" Stop! Pencils down. Now turn over the page to Exercise 5.**

EXERCISE 5. PICTURE COMPLETION (*Fore-exercise*)

(1) **" Put your finger on 1. See the picture of a boy? It has something left out. The boy has no mouth. With your pencil mark in a mouth. Don't take time to make a good mouth. A straight line will do for a mouth. Ready! Go!**

(2) **" Put your finger on 2. See the girl? She has no eye. Give her an eye. A dot will do for an eye. Ready! Go!**

(3) **" Put your finger on 3. Look at all the other pictures on this page and mark in the part that is left out. Don't stop to make fine drawings. Make just enough marks to show that you know what is left out. Ready! Go!"**

Allow 20 seconds and then say, **" Pencils down.**

EXERCISE 6. PICTURE COMPLETION

" Do not turn over this page until I tell you to do so. When I say *Turn*, you are to turn the page and find a whole page of pictures, each of which has something left out. Mark on each picture the part that is left out. Finish as many as you can before I say *Stop*. Ready! Turn!"

Allow 3 minutes and then say, **" Stop! Pencils down.** (Pause.) **Turn over the page to Exercise 7. It is upside down. Turn it right side up.**

EXERCISE 7. PICTURE COMPARISON (*Fore-exercise*)

(1) **" Put your finger on 1. See the two pictures of a hand? Are they the same?** (Get the answer from some child.) **Yes. Then make an S on the little line between them.**

(2) **" Put your finger on 2. See the next two pictures? Are they the same or different?** (Get the answer from some child.) **They are different. Then make a D on the little line between them. Ready! Go!**

(3) **" Put your finger on 3. Are the next two the same or different?** (Get the right answer from some child.) **Yes, they are the same. Then make the letter S where it should be. Ready! Go!**

(4) **" Now look at all the other pictures. If the two pictures are the same, put an S on the little line between them. If they are different, put a D on the line between them. Ready! Go!"**

Allow 10 seconds and then say, **" Stop! Pencils down.**

EXERCISE 8. PICTURE COMPARISON

" Do not turn the page until I tell you to do so. When you do turn it, you will find a whole page of pictures arranged in twos. If the two pictures are the same, put the letter S on the line between them. If they are different, put the letter D on the line between them just as you did on this page. When I say *Turn*, turn to Exercise 8 and mark as many as you can before I say *Stop*. Ready! Turn!"

Allow 20 seconds and then say, **" Stop! Pencils down! Turn the page to Exercise 9.**

EXERCISE 9. SYMBOL-DIGIT (*Fore-exercise*)

(1) **" Look at this row of pictures** (Hold up the test, and point to the top row). **Look at the first picture, a knife. What figure is under it?** (Get answer from a child.) **Yes, a 1. Look at the chicken. What figure is under it? Yes, a 2. See, each picture has a figure under it.**

(2) "Now look at the next row of pictures. There are no figures here. (Point.) You are to put the figures in with your pencil. Look at the first picture, a chicken. Find the chicken in the first row of pictures. What figure is under it? (Get answer from a child.) Yes, it is a 2. Now put a 2 in the square under the lower chicken. (Point.) Now look at the next picture in the lower row. It is a knife. The figure under the knife above is 1. Put a 1 in the right square. Look at the next picture. Find the right figure. It is 3. Put a 3 in the right place. Now work right on in the same way until you have filled each square on the page."

Allow 30 seconds and then say, "Stop! Pencils down.

EXERCISE 10. SYMBOL-DIGIT

"Do not turn the page until I tell you to do so. On the next page you will find a whole page of pictures to be numbered in the same way. You are to put the right figure in just as you did on this page. Be sure to get the right figure in each square. Begin at the top row and do as many as you can. Ready! Turn!"

Allow 1 minute and then say, "Stop! Pencils down! Turn over the page to Exercise 11.

EXERCISE 11. WORD COMPARISON (*Fore-exercise*)

(1) "Put your finger on 1. Here are two words: small — little. Do they mean the same thing? (Get the answer from some child.) Yes. Then write the letter S on the little line between them. Ready! Go!

(2) "Put your finger on 2. See the two words: no — yes. Do they mean the same? (Get the answer from some child.) No, they mean different. Then put a letter D on the little line between them.

(3) "See the next two words: fall — drop. What mark will you put on the line between them? (Get answer from some child.) Yes, put a letter S between them because they mean the same thing. Ready! Go!

(4) "Now look at the next two words: leap — jump. What letter shall we write between these? (Get the right answer from the pupils.) S is correct. Write it.

(5) "Now look at number 5. What are the words? Black — white. What shall we write on the line between them? (Get the answer.) D is correct. Write it.

"Now look at the next pairs of words. Mark them as they should be. Ready! Go!"

Allow 30 seconds and then say, "Stop! Pencils down.

EXERCISE 12. WORD COMPARISON

"Do not turn the page until I tell you to do so. When you do turn it, you will find a long list of words. The words are arranged in twos. In some cases the two words mean the same thing. In other cases the words mean different things. If the two words mean the same thing, put an S on the little line between them. If they mean different things, put a D between them. When I say *Turn*, you are to turn the page and begin work. Begin at the top of the page and be very careful to do them right, S for Same and D for Different. Ready! Turn!"

Allow 2 minutes and then say, "Stop! Pencils down. "Close your books and lay them on your desk this side up (Illustrate). The monitors will gather them up quickly and quietly, keeping them all the same side up."

V. DIRECTIONS FOR SCORING AND RECORDING

Exercises 1, 3, 5, 7, 9, and 11 are fore-exercises and are not to be scored. Score Exercises 2, 4, 6, 8, 10, and 12.

EXERCISE 2. ORAL DIRECTIONS

(1) Score is number right. Slight variation in execution if intent is clear does not invalidate the response.

(2) The following are rules for scoring the several items:

Item 1. Any line, though irregular, which surrounds the mouse is correct.

Item 2. Line should connect with points A and B so as to complete the star.

Item 3. Line should begin at the A, pass through feathered end of arrow, and end at arrow head so as to complete the arrow.

Item 4. Two zeros placed in any position after the 1 count right.

Item 5. Circles should surround the letters and not overlap the large circle.

Item 6. Line should touch or approximately touch the lines at A and B or the letters A and B and should touch the letter C or pass immediately above or below it.

Item 7. Letters should be on the pictures. Any part of the pictures, even the edge, counts right.

Item 8. Figures should be in correct order, though they need not be exactly on the pictures.

Item 9. Cross on squirrel counts right. Cross on rabbit, on the bee, or on any two pictures counts wrong.

Item 10. Cross in first square counts right; any other mark makes response wrong.

(3) Check all wrong or omitted responses and compute the number right. This is the correct score.

EXERCISE 4. COPYING DESIGNS

(1) Score is number right.

(2) Score right any drawing as good as any one of the satisfactory responses shown in the key.

(3) Check all wrong or omitted responses, and record the number right.

EXERCISE 6. PICTURE COMPLETION

(1) Score is number right.

(2) Criterion of correct response is that child evidently tried to indicate the missing part. Ignore technical

accuracy in scoring. The following rules cover the several items where there is likely to be question:

Item 4. Both lines must be completed.
Item 5. Lines joining broken stream of water. Correct.
Item 6. Correct: one, two, or three lines indicating missing veins.
Item 7. Correct: any mark indicating missing rung of ladder in right place.
Item 8. Correct: any marks indicating missing trunk. All else wrong.
Item 9. Correct: any marks to indicate missing leaves.
Item 11. Line indicating cord from base on table to end of ear trumpet is right. Nothing else.
Item 12. Correct: any mark indicating missing oar.
Item 13. Any marks indicating shadow of andiron on right counts correct.
Item 14. Correct: Line must be drawn through end of arrow in boy's right hand. Line connecting ends of bow but not touching, or approximately touching, the boy's hand scores wrong.
Item 15. Correct: Any mark to indicate missing hub scores right.
Item 16. Zero placed to left of column of mercury and midway between 20 and 20 correct. Nothing else.

(3) Check wrong and omitted items and record number of rights.

EXERCISE 8. PICTURE COMPARISON

(1) Score is R − W, rights *minus* wrongs.

(2) Check wrong and omitted items and subtract the wrongs from the rights. This is the score.

EXERCISE 10. SYMBOL-DIGIT

(1) Score is number right.

(2) Check wrong and omitted items and compute the number right.

EXERCISE 12. WORD COMPARISON

(1) Score is R − W, rights *minus* wrongs.

(2) Check wrong and omitted items. Subtract wrongs from rights. This is the score.

1. Total Score

The total possible scores are indicated in this table.

TABLE 1

Exercise	Method of Scoring	Maximum Score
2	Rights	10
4	Rights	10
6	Rights	16
8	Rights *minus* Wrongs	10
10	Rights	48
12	Rights *minus* Wrongs	25
Total		119

2. Class Record Sheet

Record names and scores on the Class Record Sheet. Obtain from Tables 2 and 3 the data for the two columns under "Nearest Standard Score." Under "Age" give the exact present age in years and months. Under "Years in School" write 3, 3½, 4, 4½, etc., to indicate the length of the time pupil has been in school, from the time he first entered any school to the date of examination.

3. Qualities

a. **Scholarship.** Assign marks for school work, using the letters A, B, C, D, E, with the following meanings:

A means superior, about the score of the best 5 per cent of children of that race and age.
B means high average, above the average, but not so good as *A*. The next best 20 per cent of the children make this score.
C means average, the score of the middle 50 per cent of that race and age.
D, low average, means below the best 75 per cent of school children of that race and age; i.e., below the middle 50 per cent, but not so poor as the lowest 5 per cent.
E means inferior, about the score of the poorest 5 per cent of the children of that race and age.

b. **Intelligence.** Think of the skill with which pupils are able to meet new situations, both in school and out. The most intelligent pupil does not always make the highest marks in school, nor is the pupil with the highest marks the most intelligent. Industry, good health, regular attendance, and other school conditions are important factors. Proceed in estimating the intelligence by the same method as was used in estimating scholarship, scoring each pupil *A*, *B*, *C*, *D*, or *E*, as indicated.

c. **Industry.** Consider the pupil's ability to apply himself to his school work, both in school and out, to learning his lessons, and to doing other set tasks. Proceed as in the case of scholarship and score each pupil *A*, *B*, *C*, *D*, or *E*, as indicated.

4. Median Score

It will sometimes be helpful to compute the median score for the class for the entire test or for each test separately. The median is the middle score when the scores are arranged in order from highest to lowest.

VI. NORMS

Tables 2 and 3 give grade and age norms. The test scores may be interpreted in terms of these norms.

TABLE 2

Revised Grade Norms for Intelligence Examination: Delta 1

Grade at end of year	1	2	3
Score	54	67	76

The norm for 6 years, 0 months, is 30 points; the norm for 6 years, 1 month, is 32 points; etc.

TABLE 3

REVISED AGE NORMS FOR INTELLIGENCE EXAMINATION: DELTA 1

	MONTH											
YEAR	0	1	2	3	4	5	6	7	8	9	10	11
6	30	32	34	36	38	40	42	44	46	48	50	52
7	54	55	56	57	57	58	59	59	60	61	62	63
8	64	65	66	66	67	68	68	69	70	70	71	71
9	72	73	74	74	75	76	76	77	78	78	79	79
10	80											

VII. HOW TO USE RESULTS OF TESTS

1. FOR GROUPING OF PUPILS

One of the functions of standard tests is to indicate the proper grouping of children in the school. However, the feasibility of placing children where the test indicates they should go depends upon available facilities.

In addition to the regular grades, the class for retarded children has become common in American schools. Such classes vary from those for feeble-minded to "opportunity classes" for normal pupils who have fallen behind for some special reason. Every school system with an enrollment of 300 pupils should have one or more such classes for backward and defective children in the hands of a teacher trained specifically for teaching such pupils. Where a class of this type exists, pupils should be transferred to it if the test indicates that they will not profit by the work of the regular class.

American schools have as yet had but little experience in training superior children separately. Classes for them should probably be organized as early as the fourth grade. The members of such a class can be chosen then, if not earlier, and they can cover the rest of the elementary school course rapidly without skipping any of the work. In order that the brightest pupils should not graduate at too early an age, the curriculum for them should be enriched. To make the best possible use of the children's time, the teacher of a superior class is in need of special preparation. From the positive social point of view the average and superior children are most important. Most of the leaders of the next generation are among the few superior pupils now in the schools. They should be discovered and set upon the road of rapid progress. They have far to go because their training must be extensive.

Another solution for misgrouping is double promotion of superior children in the lower grades. Such children quickly adjust themselves to new conditions and in some cases are soon ready to skip again. Skipping in the upper grades, particularly the seventh, is of more doubtful expediency, although, provided the child's abilities warrant the move, it is sometimes to be preferred to the lockstep which dulls interest. Physical and social qualities may or may not keep pace with the growth of intellect. Keeping the child in the same social group but enriching the course of study utilizes rapid mental development.[1]

Demoting children should be avoided both because of parental objection and because it is so likely to dull the edge of effort. If intelligence tests are used early in the child's career, demotion will not be necessary. The pupil will then not be grouped with his intellectual superiors, and the instruction he gets will be better adapted to his needs. Progress will be actually more rapid than if he is dragged along in a class more able than he is.

The general intelligence of pupils coupled with their industry is probably a good basis of classification if conditions make a regrouping of an entire class or school advisable. The best arrangement is probably a flexible grouping system which places children in a class group on the basis of their general intelligence and then allows a regrouping for the teaching of the different subjects.

2. CAUTION

A caution should be urged against basing administrative action too much on test scores. There is always the possibility that the child for some reason did not do himself justice in the test. Cases of this sort are more likely to remain undetected in group testing than in individual testing. The results should be interpreted in the light of the supplementary information on the Class Record Sheet. In the few cases where there is clear disagreement between the test results and other data, the test may be repeated or another test given. This can be done with an individual test or another group test.

Tests are not a substitute for common sense on the part of a teacher or a superintendent. If he uses test results to supplement, correct, or reinforce his observations, they will help him treat school problems more intelligently.

The test will be of greatest value for the very dull and very bright pupils. Teachers tend to overrate dull pupils and promote them to work they cannot do, and underrate superior children and keep them from advancing as rapidly as they should. A class is most easily instructed when the pupils are of the same level of ability. Dull pupils should learn tasks they can perform, and superior pupils should be released from the lockstep of a rigid grading system and set free for their most effective development.

[1] The best discussion of the matter will be found in H. H. Goddard's *School Training of Gifted Children* (World Book Company, 1928) and Leta S. Hollingworth's *Gifted Children* (The Macmillan Company, 1926).

Haggerty Intelligence Examination

DELTA 1

FOR GRADES 1–3

Arranged and standardized by M. E. Haggerty, University of Minnesota

Used in the Virginia School Survey

My name is _____ I am a _____
First name Last name Write boy or girl

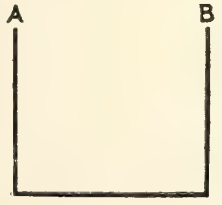
This is the _____ day of _____ 19____ I am _____ years old.

My next birthday will be _____ 19____ I am in _____ half of Grade _____

The name of my school is _____ The name of my city (county) is _____

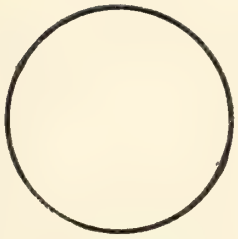
The name of my state is _____

EXERCISE 1

1 

2

3 A

4 

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EXERCISE 12

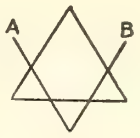
If the two words mean the same, put an **S** between them.
If they mean as different as can be, put a **D** between them.

1	big ____ large	1
2	good ____ bad	2
3	go ____ leave	3
4	quiet ____ still	4
5	wet ____ dry	5
6	high ____ low	6
7	sad ____ sorry	7
8	wide ____ broad	8
9	run ____ stand	9
10	near ____ close	10
11	sweet ____ sour	11
12	happy ____ cheerful	12
13	up ____ down	13
14	give ____ take	14
15	fear ____ fright	15
16	rude ____ polite	16
17	timid ____ shy	17
18	beg ____ plead	18
19	friend ____ enemy	19
20	order ____ command	20
21	begin ____ commence	21
22	advance ____ retreat	22
23	gradual ____ sudden	23
24	climb ____ ascend	24
25	accept ____ reject	25

Score .....

EXERCISE 2

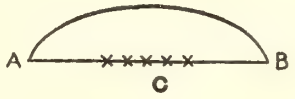
1

2 

3

4 **1**

5

6 

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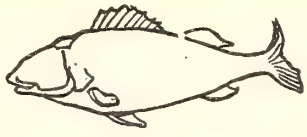

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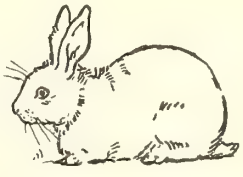


10 ☐ ☐ ☐ ☐ ☐

Score.....

1 small____little

2 no____yes

3 fall____drop

4 leap____jump

5 black____white

6 go____come

7 hit____strike

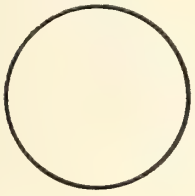
8 flower____blossom

9 sick____well

10 hot____warm

EXERCISE 3

1 A——————B C D

2  A

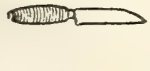
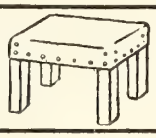
3

4

5

EXERCISE 10

Put the right figure under every picture.

					
1	2	3	4	5	6

1

2

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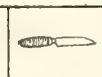
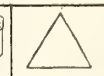
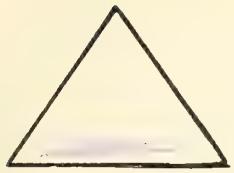
											

Score.....

EXERCISE 4

Copy these pictures.

1 

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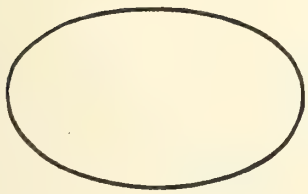
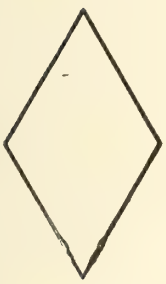
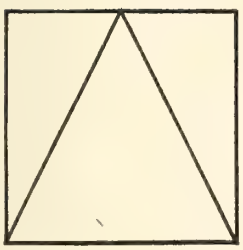
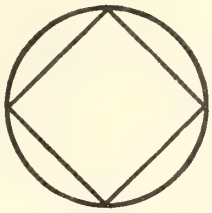
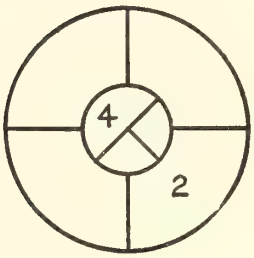
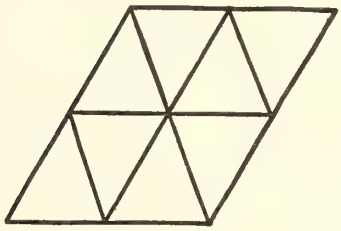
3 

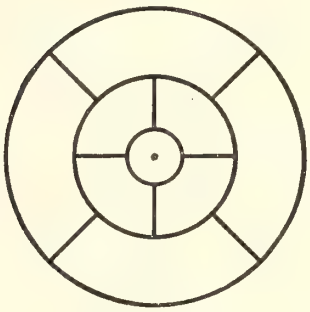
4 

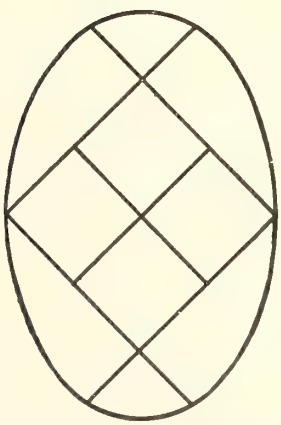
5 

6 

7 

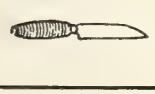
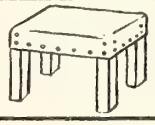
8 

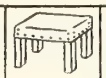
9 

10 

*Score*_____

EXERCISE 9

					
1	2	3	4	5	6

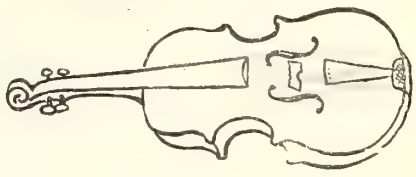
											

EXERCISE 5

1

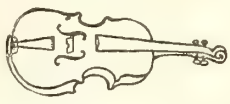
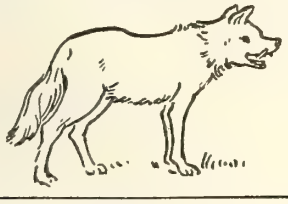
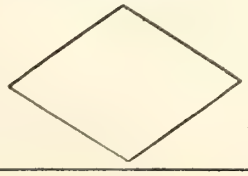
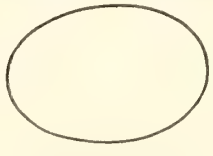
2

3



EXERCISE 8

If the two pictures are the same, put an **S** between them.
If they are different, put a **D** between them.

1		———		1
2		———		2
3		———		3
4		———		4
5		———		5
6		———		6
7		———		7
8		———		8
9		———		9
10		———		10

*Score*_____

EXERCISE 6

Mark in each picture what is left out.

1

2

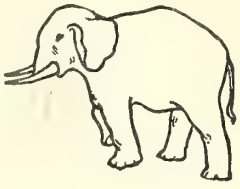
3

4

5

6

7



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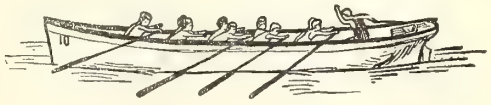
10

11



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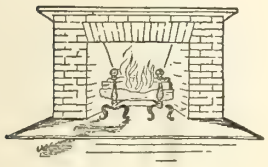

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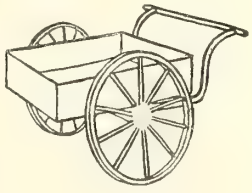

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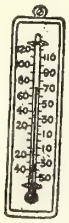
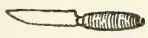


16

Score .....

EXERCISE 7

1 ———

2  ———

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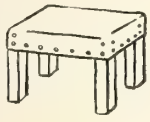
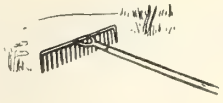
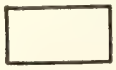
4  ———

5  ———

6 ——— 

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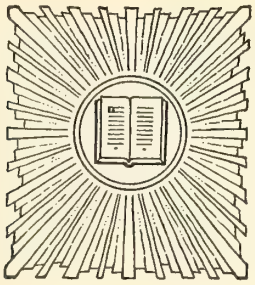
PINTNER-CUNNINGHAM PRIMARY MENTAL TEST

FOR KINDERGARTEN AND FIRST AND SECOND GRADES

By Rudolf Pintner, Ph.D.
Professor of Educational Psychology, Teachers College, Columbia University

and Bess V. Cunningham, Ph.D.
Associate Professor of Education, Teachers College, Columbia University

MANUAL OF DIRECTIONS AND KEY



Revised

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EXAMINATION: FORM A

Name .....

Age.....years.....months. Date of birth.....

Grade..... Teacher.....

Date of test.....19..... Examiner.....

School .....

City .....

Test	Score
1	
2	
3	
4	
5	
6	
7	
Total	

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Introduction

Reasons for giving tests. We all recognize that there are great individual differences in ability among children. We know that some are dull and some are bright; but we know this only in a vague, general way — as a rule, only after a considerable time has been spent with the children. Intelligence tests are designed to give us this knowledge in a definite, accurate manner and to give it to us quickly. When the teacher is confronted with a new group of children at the beginning of a school year, it is of great value to her to know the general mental ability of each child. This is of special importance with children who are just entering school, because for them there are no records of previous school work. Hence the importance of intelligence testing at this time in the kindergarten or first grade. The Pintner-Cunningham Primary Mental Test is designed to measure the mental ability of young children just beginning their school career. No knowledge of numbers, letters, words, or writing is presupposed.

Bright and slow children profit equally from a division of classes into groups as nearly homogeneous as possible. Children are happiest when attempting work neither too far beyond nor too far under their maximum capacities. The group mental test is an invaluable aid in the classification of school children.

Adaptation of group tests to very young children. In constructing a test for use among young children, certain prerequisites must be kept in mind. Kindergarten children are not familiar with the printed word, and children in the first grade have not sufficient acquaintance with reading to make the use of letters or digits a proper tool for mental testing. The introduction of such material tends to make the test a measure of school achievement rather than of native capacity. The picture is more nearly universal in application than the letter or digit. In making a response, the introduction of letters or numerals similarly complicates the test results. Only the simplest mark should be required of the child.

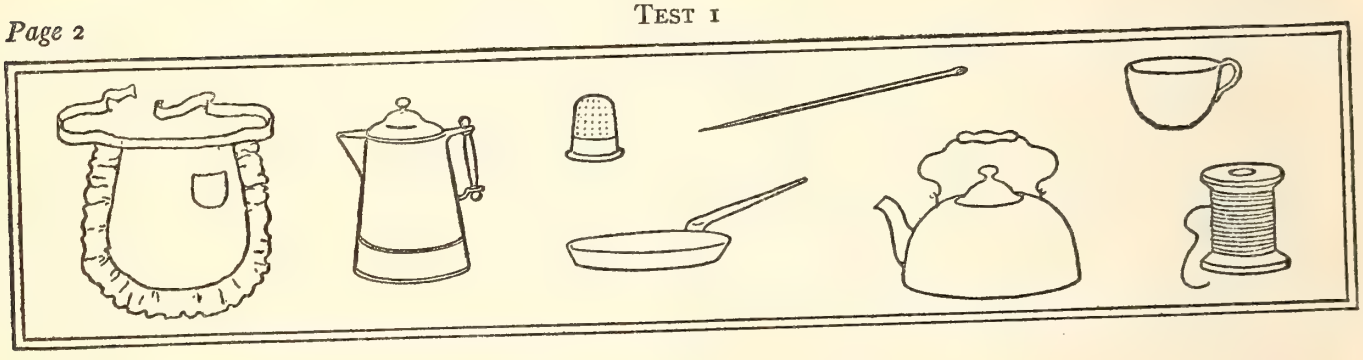
A second point which must be characteristic of a good group test for young children is universality of interest, in order that no group of children in a particular environment may have an advantage over any other group. The subject matter of the test must be so selected as to attract and hold the attention of each child. This test has been designed with these particular requisites in mind.

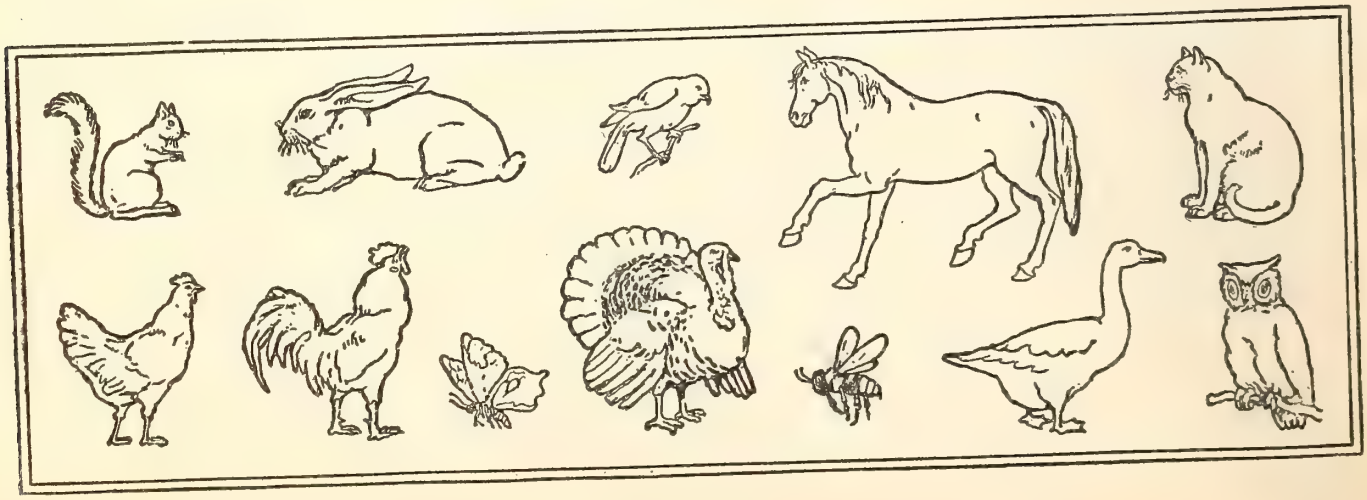
Practical Applications of Test Results

Advantages to be gained. Although planned especially to aid in the classification of kindergarten and first-grade children, this test may well be used in the second grade. The advantage of using the same test in the kindergarten and

Page 2

Test 1





the first two grades is obvious. A comparison of results will indicate the degree of overlapping in mental ability among the children in the kindergarten and the first and second grades. Rapid advance through school is not in itself a fundamental aim, but it is one means of adapting the school work to individual needs. Children whose performance on the test shows mental ages much greater than the average of the group in which they are placed should certainly be given opportunities to progress at their own speed. Experiments in grouping children in accordance with mental-test ratings have shown that a great economy of time and effort results for teacher as well as for children. The greater opportunity offered the bright child does much to break the lock step of the traditional school. Experiments have also demonstrated that the slow child is greatly benefited by the adaptation of the curriculum to his particular needs. The test result should be used as a guide in promotion to a higher grade as well as in the classification of groups within a grade.

Reliability. Coefficients of correlation between two trials of the test given about two days apart are as follows:

Correlation between	Number	Grade	Coefficient
First and second trial . .	22	K	.88
First and second trial . .	23	K	.93

The probable error of a score has been found to be 2 points. This shows the test to be very reliable. The "probable error" is the median value of the errors which are expected to exist in the scores obtained in the test.

Comparison with other tests. Coefficients of Correlation have been obtained between this test and various other tests of mental ability. These are given in Table 1.

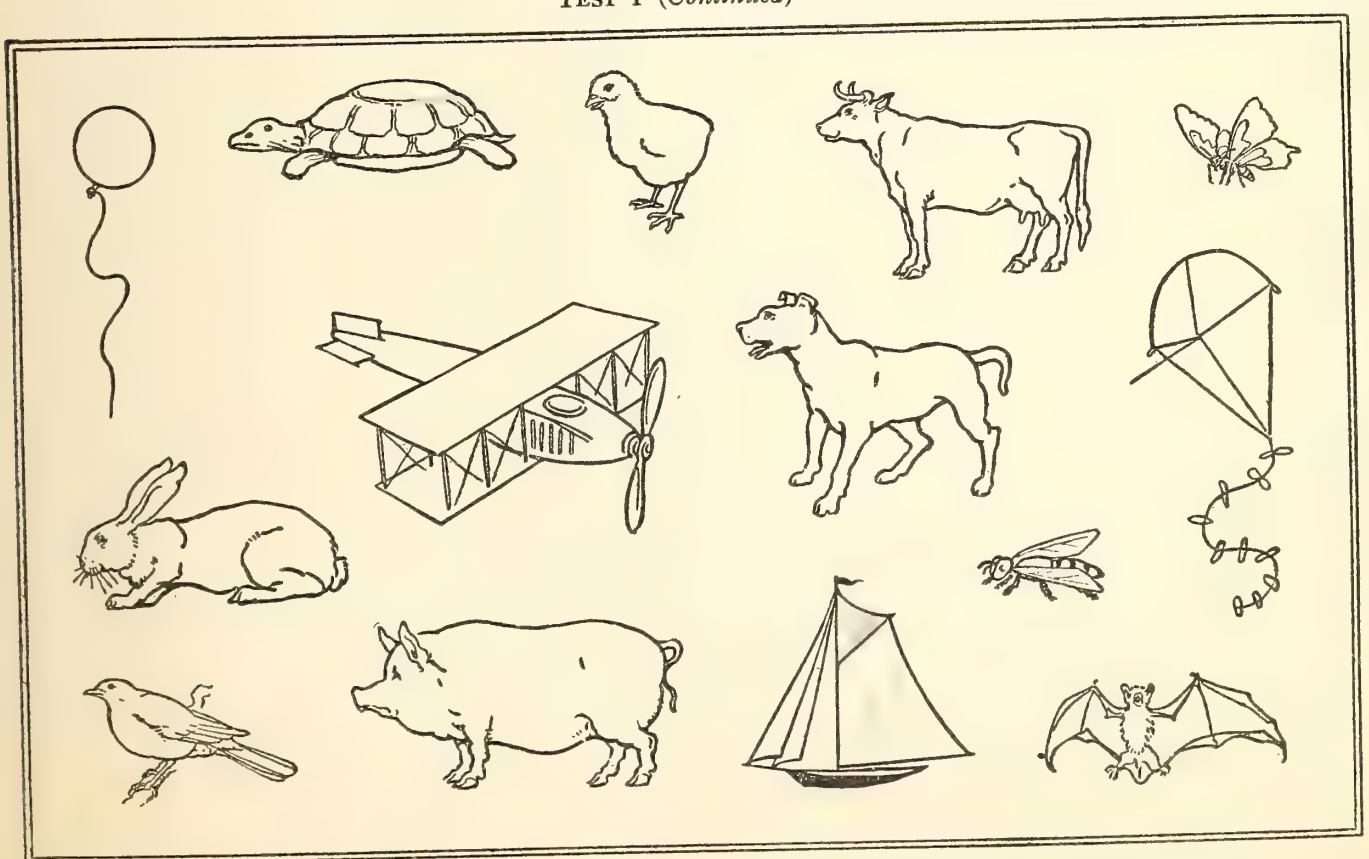
TABLE 1

SHOWING COEFFICIENTS OF CORRELATION BETWEEN THE PINTNER-CUNNINGHAM PRIMARY MENTAL TEST AND VARIOUS OTHER TESTS

Correlation with	Number	Grade	Coefficient
Stanford Revision of the Binet-Simon Tests	19	1	.82
Stanford Revision of the Binet-Simon Tests	20	K	.71
Stanford Revision of the Binet-Simon Tests	17	K	.55
Kingsbury Primary Group Intelligence Test	74	1 & 2	.56
Otis Group Intelligence Scale: Primary Examination	39	2	.66
Otis Group Intelligence Scale: Primary Examination	36	K	.66
Teachers' Ranking	19	1	.78
Teachers' Ranking	26	2	.64
Teachers' Ranking	36	K	.78
A Composite [1]	26	2	.78
A Composite	39	2	.78
A Composite	44	1	.81
A Composite	36	K	.83

[1] A composite rating in mental ability made up for a practical purpose and consisting of the teachers' rating, the Otis or Kingsbury score, and the score in this test itself.

TEST 1 (*Continued*)



Total number right..... *Total number wrong*..... *Score* $\left(\frac{R-W}{2}\right)$.....

Directions for Administering

The number of kindergarten children that should be tested at any one time will depend upon the skill of the examiner and the amount of assistance available. If the examiner is alone, probably not more than ten or fifteen children should be examined together. If there are one or two assistants to help in seeing that the children have turned to the right page, then a group of twenty or thirty may be easily handled. In the first and second grades there is no problem as to the number who can take the test at any one time.

Seat children so as to minimize chances for copying from one another. Provide the children with soft pencils or sharp crayons. See that each child's name is written on his booklet. Additional data as to age, grade, etc., should be obtained from the teacher at another hour. Pass booklets to children, asking them to keep the books closed until told to open them. Be very deliberate in giving all directions. Everything that is to be said to the children is printed in boldface type. Do not read anything else to the children.

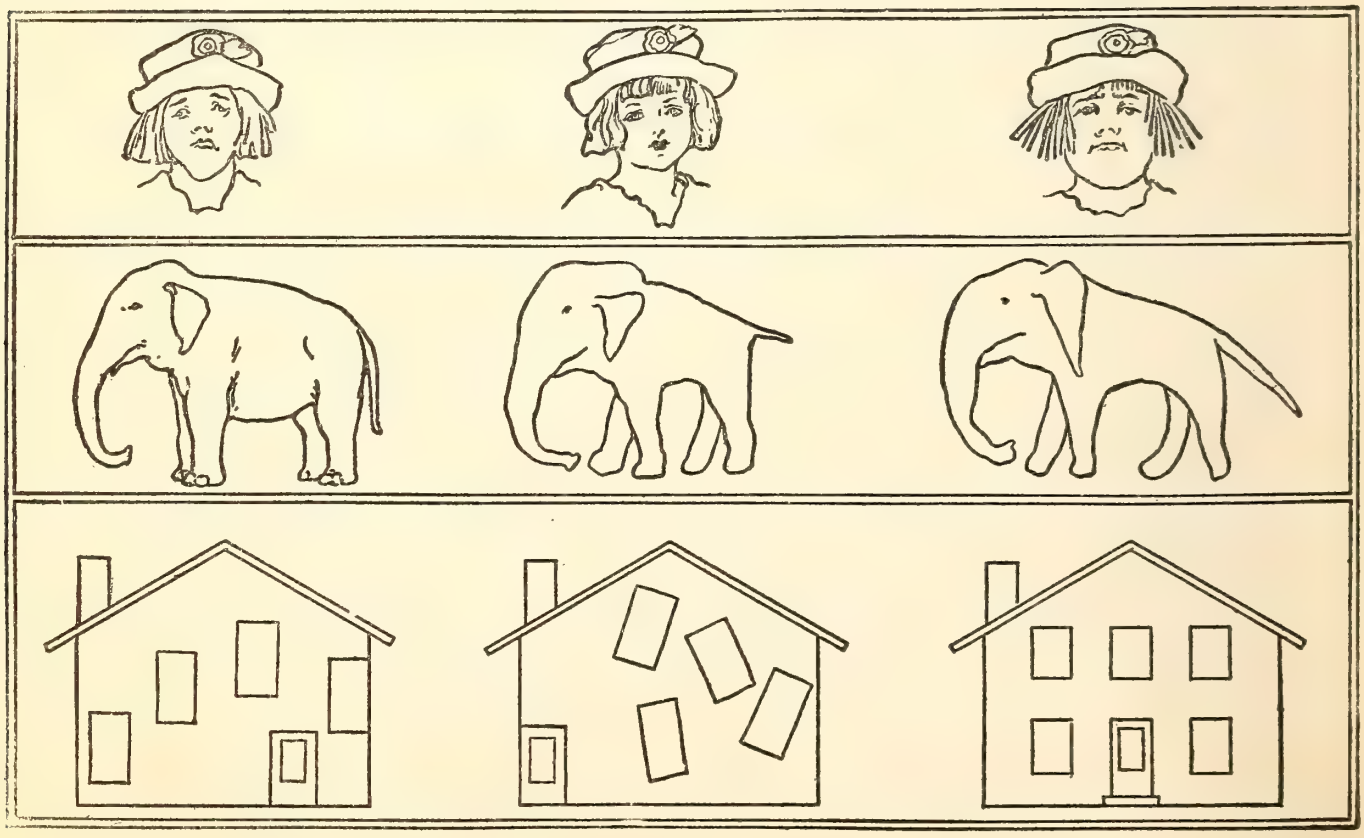
When books have been distributed, say: **We are going to play some games with the pictures in this book. We are going to mark in this book. Listen carefully to everything that I say so that you will mark just the right things. Open your books** (illustrate by turning to page 2) **and fold them back like this, so that you can see an apron.** (See that all have the right page.)

Test 1. Common Observation (pages 2 and 3)

Page 2. **Look at the pictures.** (Indicate the first row, page 2.) **We are going to put some marks on some of the pictures, but not on *all* of them. Let's mark the things that Mother uses when she sews her apron. Can you find the apron? Put your finger on it. Mark it like this.** (Draw line on board.) **Mark just the apron and not anything else.** (See that all have followed directions. Any kind of mark that indicates the object is satisfactory.) **Now we are going to look for something else that she would need to use in sewing her apron. She would not need a coffeepot. We must not mark it. Would she need a thimble? Yes, mark it.** (Pause.) **She would not need a kettle. Do not mark the kettle. There are two more things that she would need to sew her apron. Find them and mark them. Be careful — mark just the right things.** (Allow a reasonable time.)

Now look at these pictures. (Indicate lower section on page 2.) **These pictures show some things that have feathers and some that do not have feathers. Find all the things that have feathers, and mark them. Remember**

Test 2



that some have feathers and some do not. Put a mark on each thing that has feathers. Go ahead! (Time, 30 seconds.)

Page 3. Turn over your books, so that you can find an airplane. These pictures show some things that go up into the air. Find them and mark each thing that goes up into the air. Go ahead! (Time, 30 seconds.) Turn over the page like this.

Test 2. Æsthetic Differences (pages 4 and 5)

Page 4. This is something different. Look at the three little girls at the top of the page. (Point.) I want you to find the prettiest. Don't tell any one, but look at all the girls. Then put a mark on the prettiest girl. Go ahead! (Wait until all have finished.) Now look at all the elephants. Mark the prettiest elephant. (Pause not longer than 10 seconds.) Look at all the houses. Mark the prettiest house. (Pause 10 seconds.)

Page 5. Turn your books over, so that you can see some flowers. Look at all the flowers. Mark the prettiest flower. (Pause 10 seconds.) Look at all the strings. Mark the prettiest string. (Pause 10 seconds.) Look at all the dancers. Mark the prettiest dancer. (Pause 10 seconds.) Turn over the page, so that you can see a hat.

Test 3. Associated Objects (pages 6 and 7)

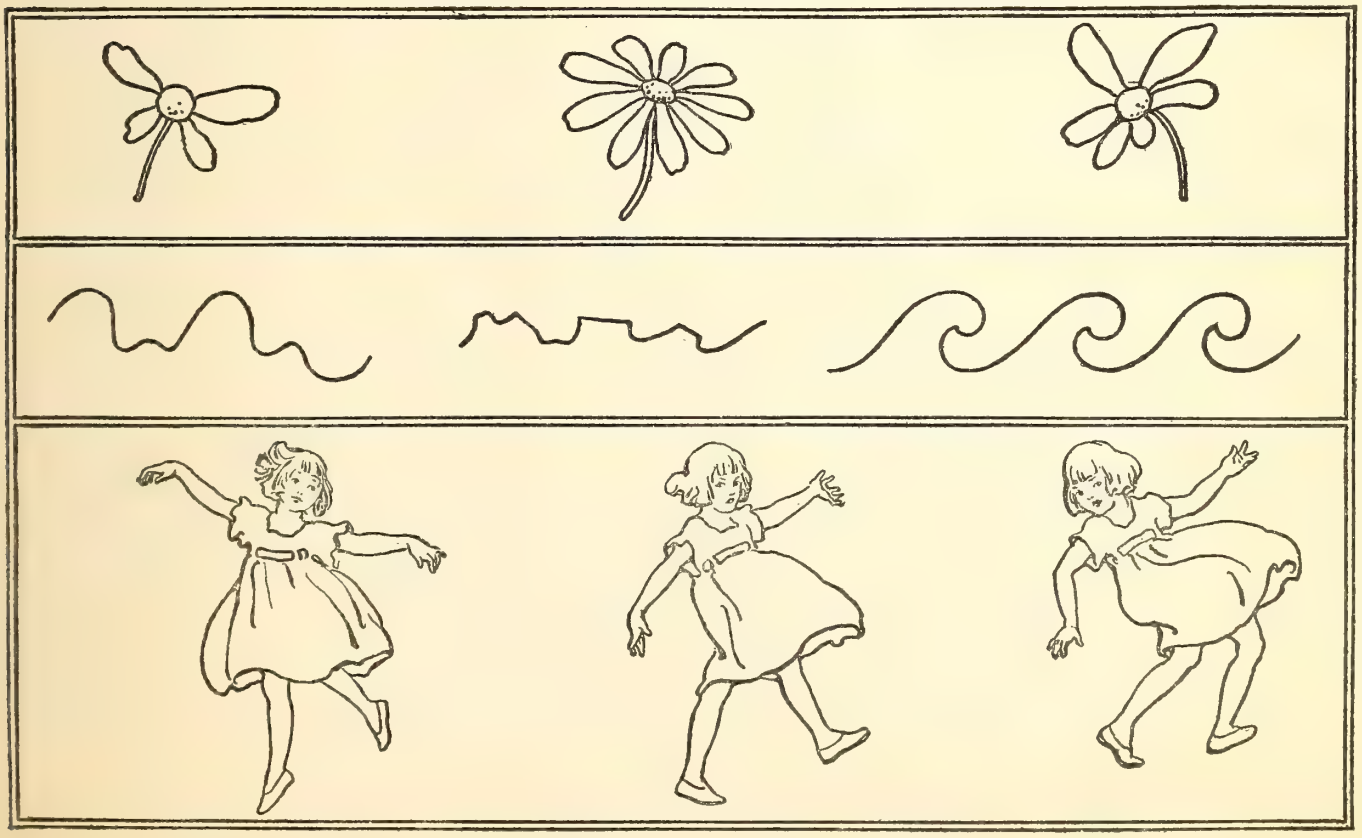
Page 6. Here are pictures of some things that belong together. (Point to first row.) There are *two* things that belong together in this row. Let's see if we can find them — a coat and a hat — a pan — a hammer. Put a mark on the hat. Now mark something that belongs with the hat. (Time, 15 seconds.) Look at the next row. Find *two* things that belong together, and mark them. (Time, 15 seconds.) Look at the next row. Mark the two things that belong together. (Time, 15 seconds.) Turn your books over, so that you can see a nail.

Page 7. Find the *two* things that belong together in the top row. Mark them. (Time, 15 seconds.) Find the *two* things that belong together in the next row. Mark them. (Time, 15 seconds.) Find the *two* things that belong together in the next row. Mark them. (Time, 15 seconds.) Turn over the page, so that you can see a doll.

Test 4. Discrimination of Size (page 8)

Page 8. Here is a doll, and here are some doll clothes. Look at the dresses. One dress is too big for this doll, one is too little, and one is just right. Find the dress that is just right. Put a mark on it. (Time, 15 seconds.) Look at the hats. Mark the hat that is just right. (Time, 15 seconds.) Look at the shoes. Mark the pair of shoes

TEST 2 (*Continued*) *Page* 5



Score.....

that is just right. (Time, 15 seconds.) **Look at the gloves. Mark the pair that is just right.** (Time, 15 seconds.) **Turn your book over, so that you can see a girl and a squirrel.**

Test 5. Picture Parts (pages 9, 10, and 11)

(Method of giving here is very important.)

Page 9. **Put your finger on the little picture of a girl and a squirrel.** (See that all do it.) **Put a mark on the little girl that is looking at a squirrel.** (Pause.) **Now find another little girl that is just like her. Mark her.** (Pause.) **Find one other thing outside the little picture that is just like something *in* the little picture, and mark it.** (Time, 30 seconds.)

Look at the next picture, of a boy riding on a pig. Mark the pig. (Pause.) **Now find another one just like it outside the little picture. Mark it.** (Pause.) **Now look at the little picture again. See just what belongs in the picture. You have marked the pig. Find two more things that belong to the little picture. Find them outside the little picture and mark them. Go ahead!** (Time, 30 seconds.) **Turn over the page, so that you can see a boy beating a drum.**

Page 10. **Look at the picture of a boy beating a drum. Look at the little picture. See just what belongs to the little picture, then find the same things outside the little picture. Mark them. Go ahead!** (Time, 30 seconds.)

Now look at the Christmas picture. See how many things belong to the little Christmas picture. Find them all outside and mark them. Go ahead! (Time, 45 seconds.) **Turn your books over, so that you can see a boy blowing bubbles.**

Page 11. **Look at the bubble picture. See how many things belong to this picture. Now find all of the same things outside. Mark them. Be very careful to find them all. Go ahead!** (Time, 1 minute.) **Turn over the page, so that you can see a little man.**

Test 6. Picture Completion (pages 12, 13, and 14)

Page 12. **Here is a picture of a man. Something is gone. What is it?** (Wait for an answer.) **Yes, his head is gone. Can you find it? Put a mark on the head that belongs to the man.** (Time, 10 seconds.)

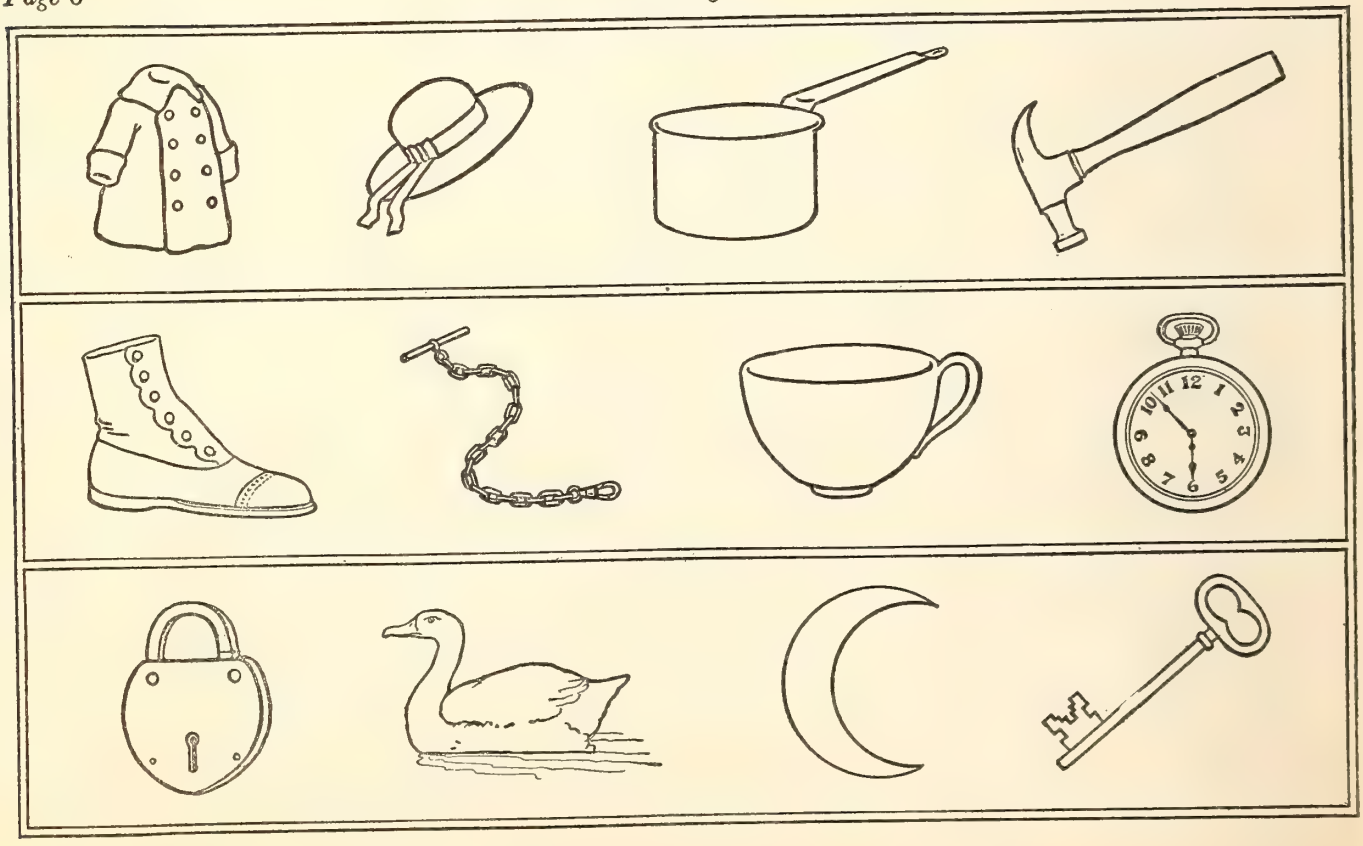
Look at the next man. Something is gone from this man. See if you can find just what is gone. Mark it. (Time, 10 seconds.)

Look at the last man. Find what is gone from this man and mark it. (Time, 10 seconds.) **Turn your books over, so that you can see a duck.**

Page 13. **Look at the picture of the duck. Find what is gone from the duck, and mark it.** (Time, 10 seconds.)

Page 6

TEST 3



Look at the man. Find what is gone from *the picture of the man* and mark it. (Time, 10 seconds.)

Look at the cherries. Mark what is gone. (Time, 10 seconds.) **Look at the boy. Mark what is gone.** (Time, 10 seconds.) **Turn over the page, so that you can see some lines.**

Page 14. **Look at these four pictures. There is something gone from each one. Find what is gone, and mark it. Mark what is gone from this one — then this one — then this one — and this one.** (Indicate *all.*) (Time, 1 minute for this page.) **Turn your books over, so that you can see some dots.**

Test 7. Dot Drawing (pages 15 and 16)

Page 15. **We are going to draw some pictures just like the pictures on this page. Do you see how the chair is made? The lines are drawn to the dots. Here are some dots to make another chair just like this one. Draw a chair here.** (Indicate dots opposite chair.) **Make it exactly like this one.** (No time limit.)

Now look at the star. See just how it is drawn. In these dots make another one just like it. (Time, 15 seconds.)

Now look at the square and the house. Draw a square here and a house here. Go ahead! (Time, 30 seconds for both.) **Turn over the page.**

Page 16. **Here are four more pictures to draw. Look at each one. See just how it is drawn. Draw the four pictures in the dots on this page — here and here and here and here. Go ahead!** (Time, 2 minutes for the page.) **Stop.**

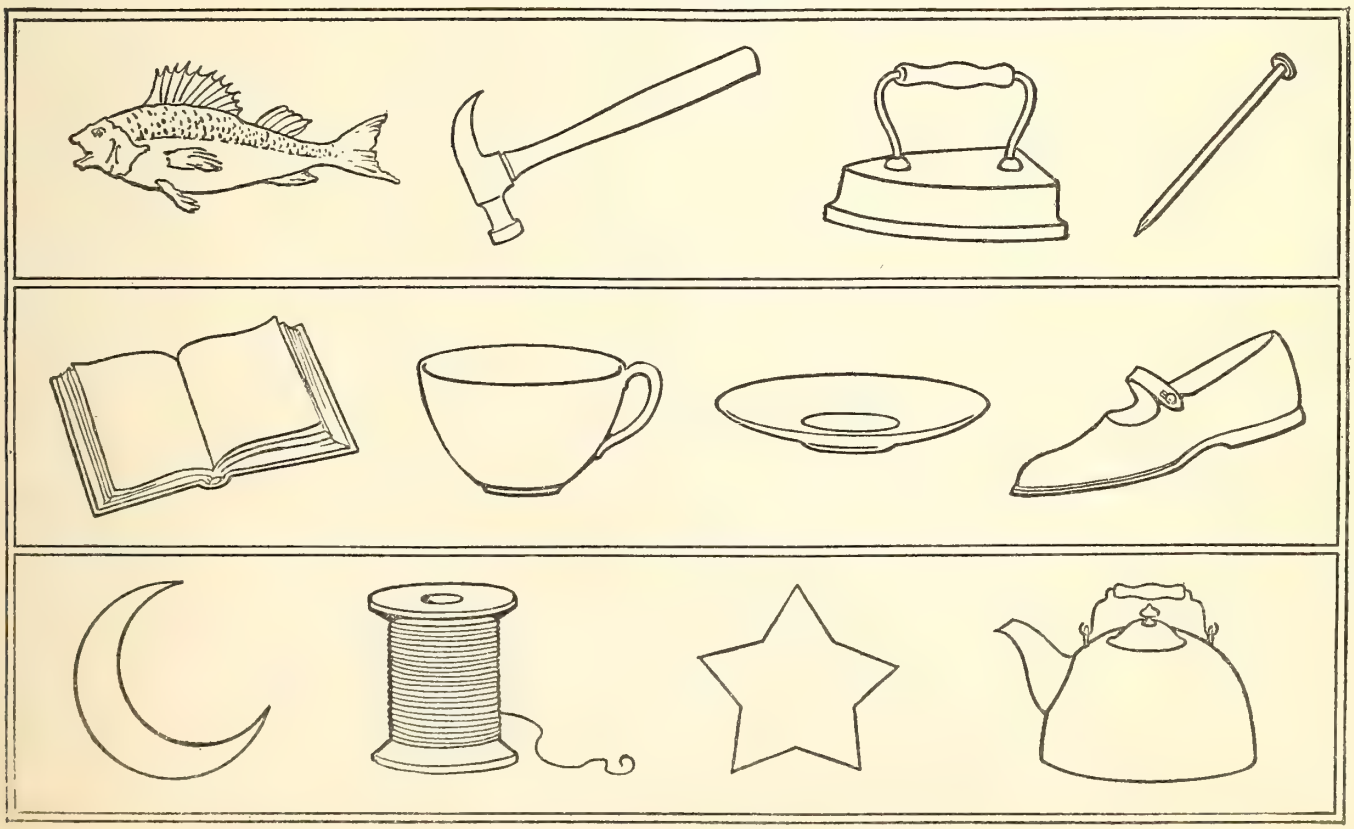
(Collect the booklets. Be sure that each child's name has been written on the booklet by the teacher.)

Directions for Scoring

General Directions. The Total Score in the examination is the sum of the scores in the seven tests. The score in each test, except Tests 1 and 5, is simply the number of "rights" — that is, the number of correct responses. What constitutes a correct response in each test is given in the accompanying Scoring Schedule (Table 2 on page 8).

In Tests 1 and 5 the score is obtained by subtracting the "wrongs" from the "rights" and dividing by 2. A "right" is a response in which an object which should be marked is marked. A "wrong" is a response in which an object is marked which should not be marked. Objects which are not marked do not count as either right or wrong. Count the total number of right responses and the total number of wrong responses in all the parts of the test. Subtract the total number wrong from the total number right and *divide this difference by 2.*

If the number of wrongs exceeds the number of rights, give the test a score of zero.



Score.....

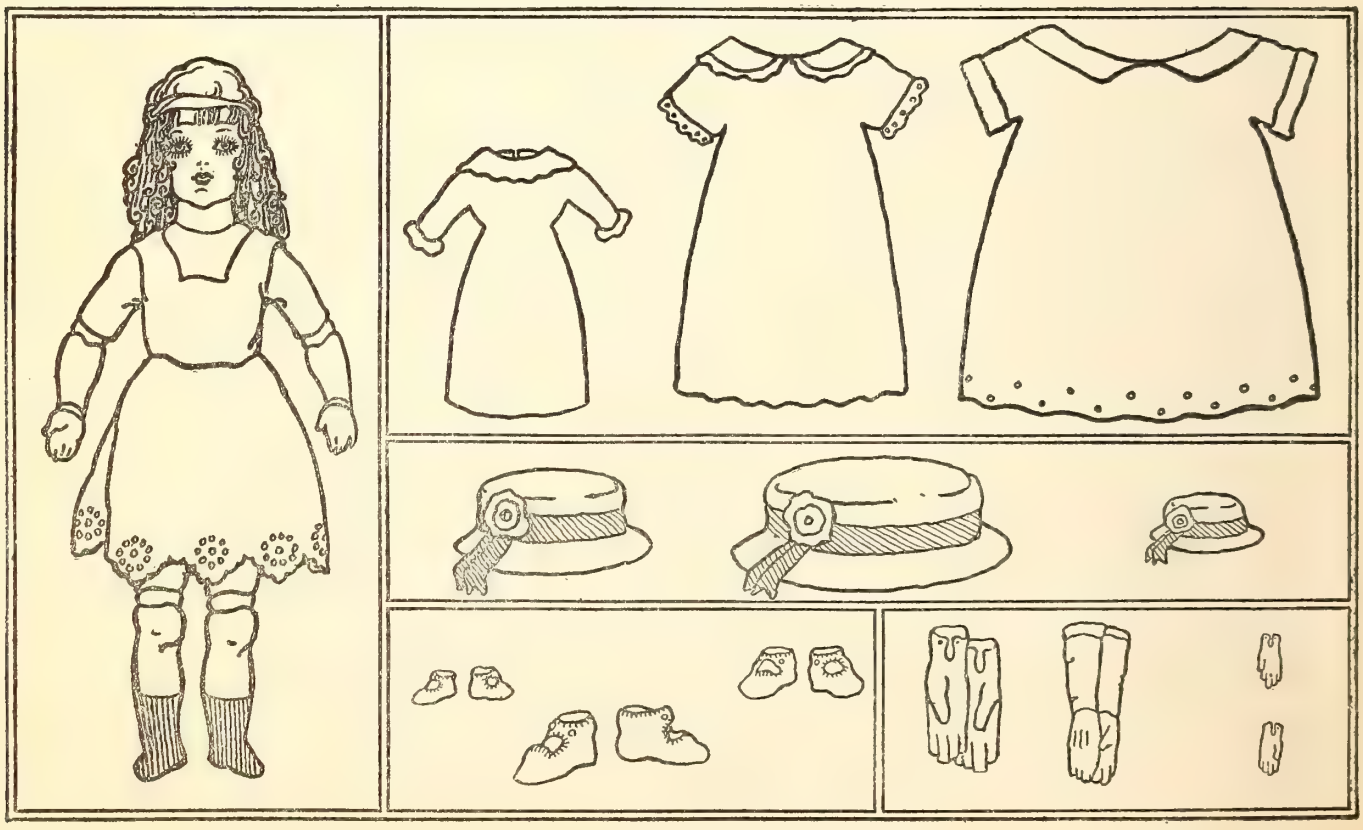
TABLE 2

KEY AND SCORING SCHEDULE

Test	Section	Objects to be marked	Responses	Scoring Formula	Maximum Score
1	Part 1	apron, thimble, needle, thread	4	R−W / 2	8½
	Part 2	bird, hen, rooster, turkey, duck, owl	6		
	Part 3	balloon, airplane, bird, butterfly, bee, kite, bat	7		
2	Page 4	middle girl, left elephant, right house	3	Rights	6
	Page 5	middle flower, right line, left girl	3		
3	Page 6	coat and hat, watch and chain, lock and key	3	Rights	6
	Page 7	hammer and nail, cup and saucer, moon and star	3		
4	Page 8	middle dress, left hat, right shoes, middle gloves	4	Rights	4
5	Part 1	girl, squirrel	2	R−W / 2	15
	Part 2	pig, boy, basket	3		
	Part 3	doll, drum, girl dancing in middle, drumstick, boy at right	5		
	Part 4	elephant at top, Jack-in-box at left, package, drum, Christmas tree with candles in middle, doll at top, wagon, soldier at right	8		
	Part 5	three-step frame piece at upper left, same in middle, small frame piece at lower left, small frame piece below flower, bowl, larger bubble, boy at left, pipe, dog, flower pot, plant at right, hat at bottom	12		
6	Page 12	boy's head, arm above large hand, leg at left with rounded top	3	Rights	11
	Page 13	leg at right, part of cane, stem, stick for flag	4		
	Page 14	line at left, right angle at bottom, horizontal line in middle, angle at left	4		
7	Page 15	each drawing counts one point	4	Rights	8
	Page 16	each drawing counts one point	4		
		If total score contains half a point, add another half point.		Total	59

Page 8

TEST 4



Score. . . . . .

It is suggested that each correct response be indicated by a check mark and each incorrect response (wrong) in Tests 1 and 5 be indicated by drawing a line around the object incorrectly marked. This will distinguish wrongs from rights very clearly.

Record the score in each test in the space provided in the lower corner of the last page of the test. Copy the scores on to the first page of the test booklet and add to find the Total Score. Neglect fractions in the total; that is, add another half point to any total score containing half a point.

The scorer should mark one test booklet as indicated in the schedule and use the marked copy for scoring. In scoring, accept any kind of mark made by the child in all tests except Test 7.

Special Directions

In Test 2 a row is not correct if more than one object is marked.

In Test 3 a row is not correct if more than two objects are marked.

In Test 4 a response is not correct if more than one dress, etc., is marked.

In Test 6 a response is not correct if more than one object in a section is marked.

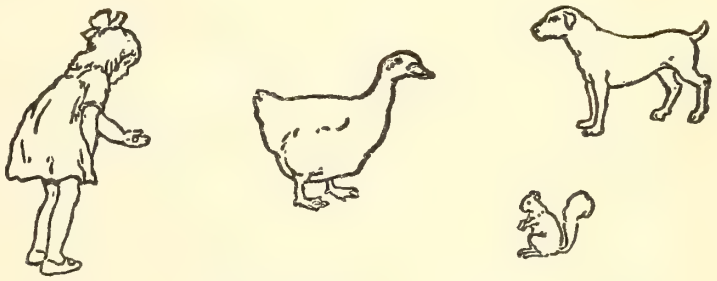
In Test 7 the lines must be drawn to the dots as in the copy. Be sure that no lines are omitted. If additional lines are drawn, score correct provided the essential lines are all drawn. If the object is correctly drawn but in the wrong set of dots, count the response as right.

Interpretation of Results

Mental ages. The mental ability of a child is measured directly by his score in the test. It is often convenient, however, to express the score in terms of a mental age. On the basis of the scores of 29,533 pupils of ages 4 years to 9 years, a table (Table 3, page 10) has been drawn up showing the mental age represented by each score. Mental ages are expressed both in terms of years and months and in terms of months only. The second form is convenient for finding an intelligence quotient (IQ). (See below.) According to the table, a score of 20 represents a mental age of 5 years and 8 months, or 68 months. A child making a score of 20 may be said, therefore, to have a mental ability equal to that of a normal child of 5 years and 8 months.

Intelligence Quotients

The term "Intelligence Quotient" (IQ) was devised for use with the Binet-Simon Intelligence Scale. It is the quotient obtained by dividing the mental age of a child by his chronological age when age is expressed in months.



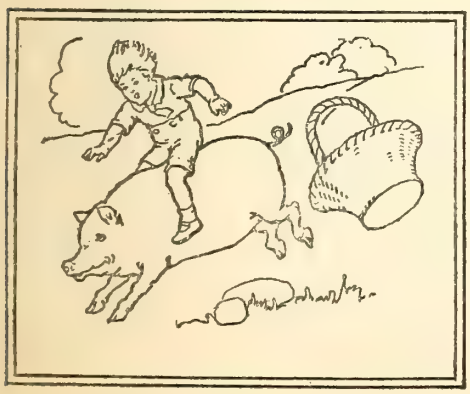


TABLE 3

REVISED MENTAL AGES CORRESPONDING TO SCORES

(Based on 29,533 cases)

Score	Mental Age		Score	Mental Age		Score	Mental Age	
	Years and Months	Months		Years and Months	Months		Years and Months	Months
1	3:10	46	21	5: 9	69	41	7:11	95
2	3:11	47	22	5:10	70	42	8: 0	96
3	4: 0	48	23	6: 0	72	43	8: 2	98
4	4: 1	49	24	6: 1	73	44	8: 3	99
5	4: 3	51	25	6: 2	74	45	8: 5	101
6	4: 4	52	26	6: 3	75	46	8: 6	102
7	4: 5	53	27	6: 4	76	47	8: 7	103
8	4: 6	54	28	6: 6	78	48	8: 9	105
9	4: 7	55	29	6: 7	79	49	8:10	106
10	4: 9	57	30	6: 9	81	50	8:11	107
11	4:10	58	31	6:10	82	51	9: 0	108
12	4:11	59	32	6:11	83	52	9: 2	110
13	5: 0	60	33	7: 1	85	53	9: 3	111
14	5: 1	61	34	7: 2	86	54	9: 4	112
15	5: 3	63	35	7: 3	87	55	9: 5	113
16	5: 4	64	36	7: 5	89	56	9: 7	115
17	5: 5	65	37	7: 6	90			
18	5: 6	66	38	7: 7	91			
19	5: 7	67	39	7: 9	93			
20	5: 8	68	40	7:10	94			

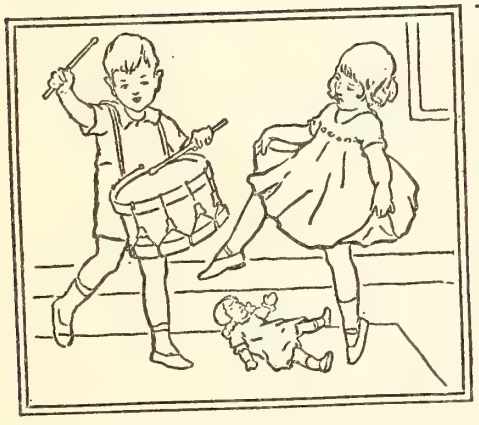
An intelligence quotient of any child tested by the Pintner-Cunningham Primary Mental Test can be calculated in the same manner. Thus, convert the pupil's chronological age into months, find in Table 3 the mental age, expressed in months, which corresponds to the pupil's score on the test, and then divide the mental age by the chronological age. A table of intelligence quotient values[1] or a slide rule should be used for quick and accurate work.

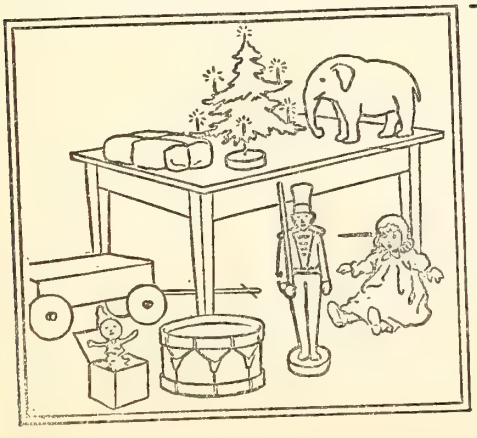
IQ's between 90 and 110 indicate "average intelligence." An IQ above 110 means that a child has more than average intelligence; one below 90 means less than average intelligence. The IQ is the best indication of the rate of growth in mental ability.

Kindergarten children. Children in the kindergarten are almost always under 6 years of age chronologically. If, therefore, we find in our kindergarten group, children who test 6 or above, they may have the mental ability to do first-grade work. If, however, such children are immature, let us put a mental age limit of 6½ years or at most 7 years above which children should be given an opportunity to try first-grade work. The impossibility of setting any one definite age limit is due to the great variation in physiological and social development among these children. Until

[1] A book of tables called *Inglis Intelligence Quotient Values*, arranged by Alexander Inglis and published by World Book Company, Yonkers-on-Hudson, New York, will be found valuable for this purpose.

TEST 5 (*Continued*)





we know more about these factors, we must be careful to consider the mental age level as merely suggestive.

The children who remain in the kindergarten may be divided into as many sections as are available, grouping those who make the best scores in one section, the next best in the next, and so forth.

First-grade children. Terman and Dickson[1] believe that there is little chance for a child with a mental age below 6 years to do first-grade work. Children with mental ages of $6\frac{1}{2}$ or 7 years will probably be able to cope with the subject matter of the first grade, although they may be chronologically younger. On the other hand, some children testing mentally $7\frac{1}{2}$ years or above — that is, having scores of 35 points or more — may have mental ability which will enable them to do successfully second-grade work. But since these children have never been to school before and therefore do not have the necessary amount of skill in such tool subjects as reading and writing, it would be a mistake to promote them immediately into the second grade. They should be given special attention and promoted to the upper first grade in a month or so, and later to the second grade. In other words, they should not be allowed to stagnate in the first grade. Pay special attention to them.

[1] See L. M. Terman and others, *Intelligence Tests and School Reorganization*, published by World Book Company, Yonkers-on-Hudson, New York.

The majority of the pupils will have mental ages from 6 years to $7\frac{1}{2}$ years, or scores from 22 to 35, and they should be grouped into bright and dull sections according to the number of sections available.

Some of the pupils will probably have mental ages below 6 years, or scores below 22. These pupils in all probability do not possess enough mentality to cope with first-grade work. Having entered at the chronological age of 6, they do not in general belong in the kindergarten. They must be assigned to a special class or be given special attention in a group arranged to meet their needs.

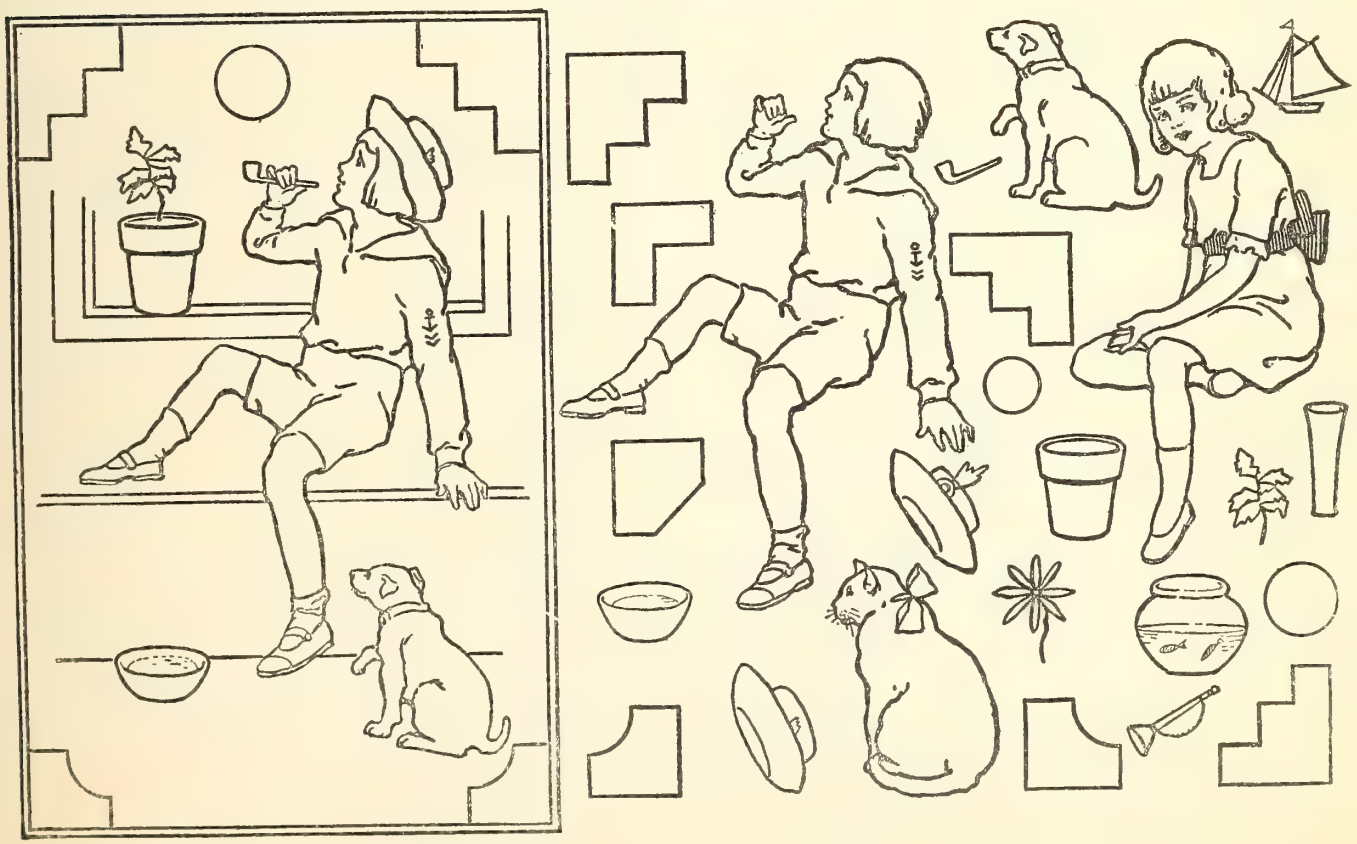
Grade Norms

The grade norms given in Table 4 are derived from 9292 cases. The tests were given in January. In giving norms for Grades Three and Four it is not implied that the tests are suitable for those grades. They are given to aid in the interpretation of high scores.

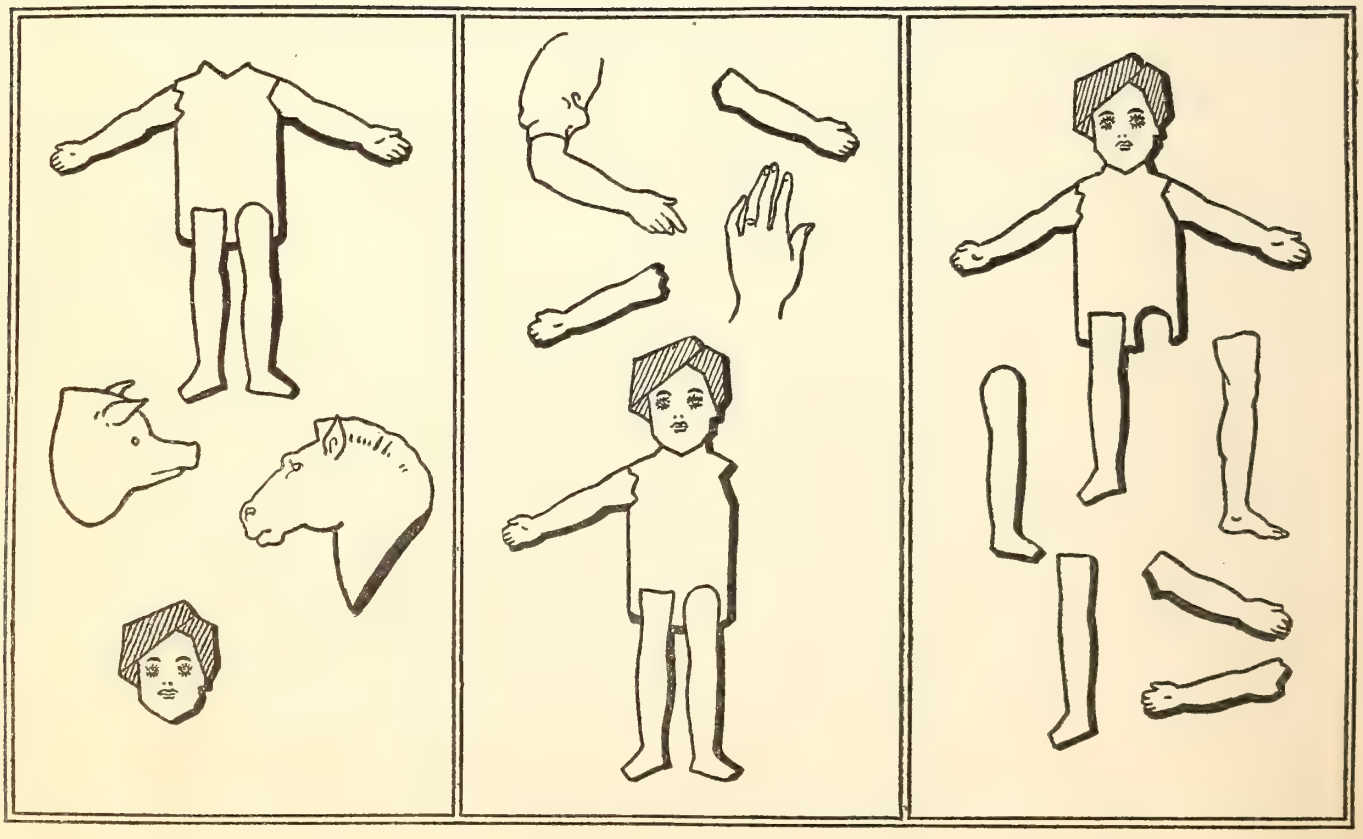
TABLE 4

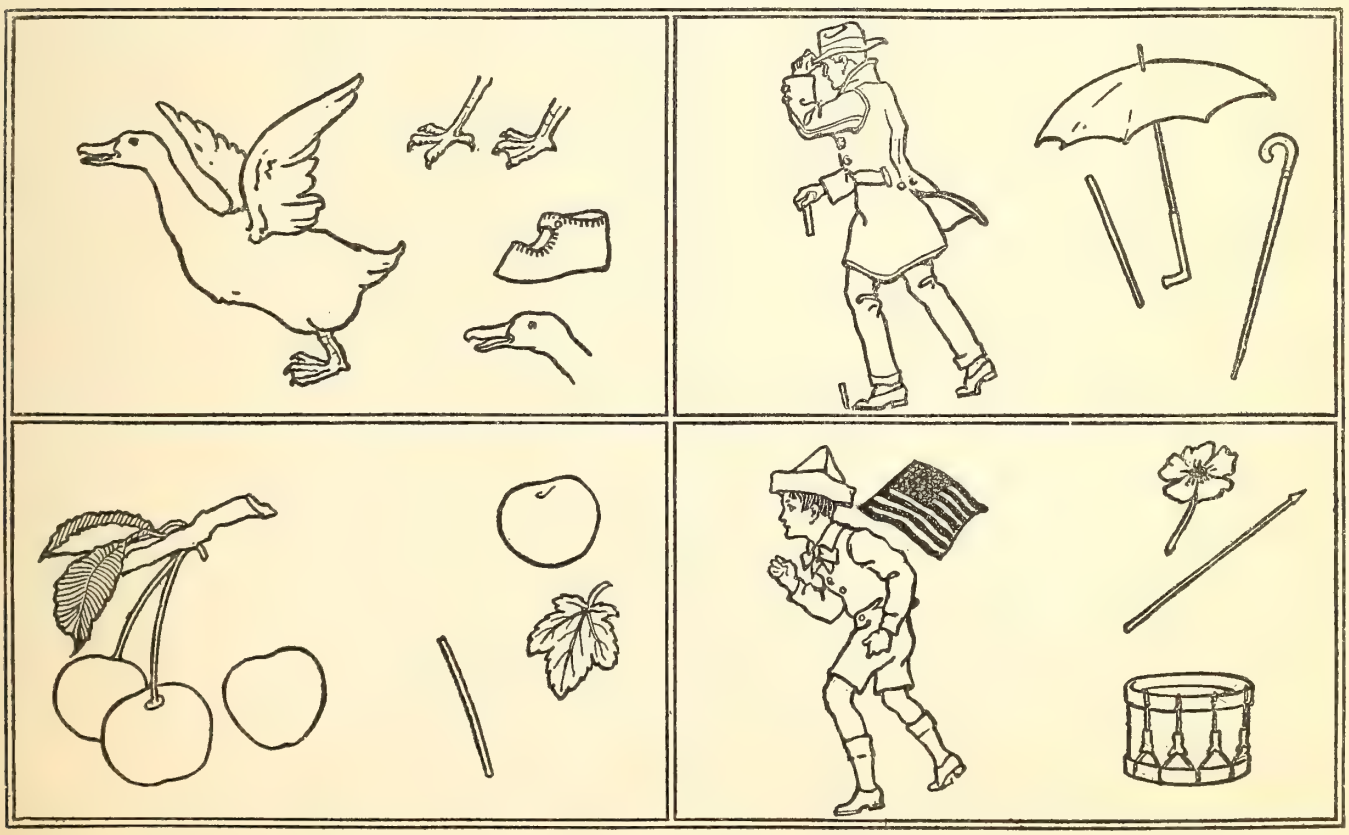
Grade Norms

Grade	K	I	II	III	IV
Norm	20	30	41	46	51

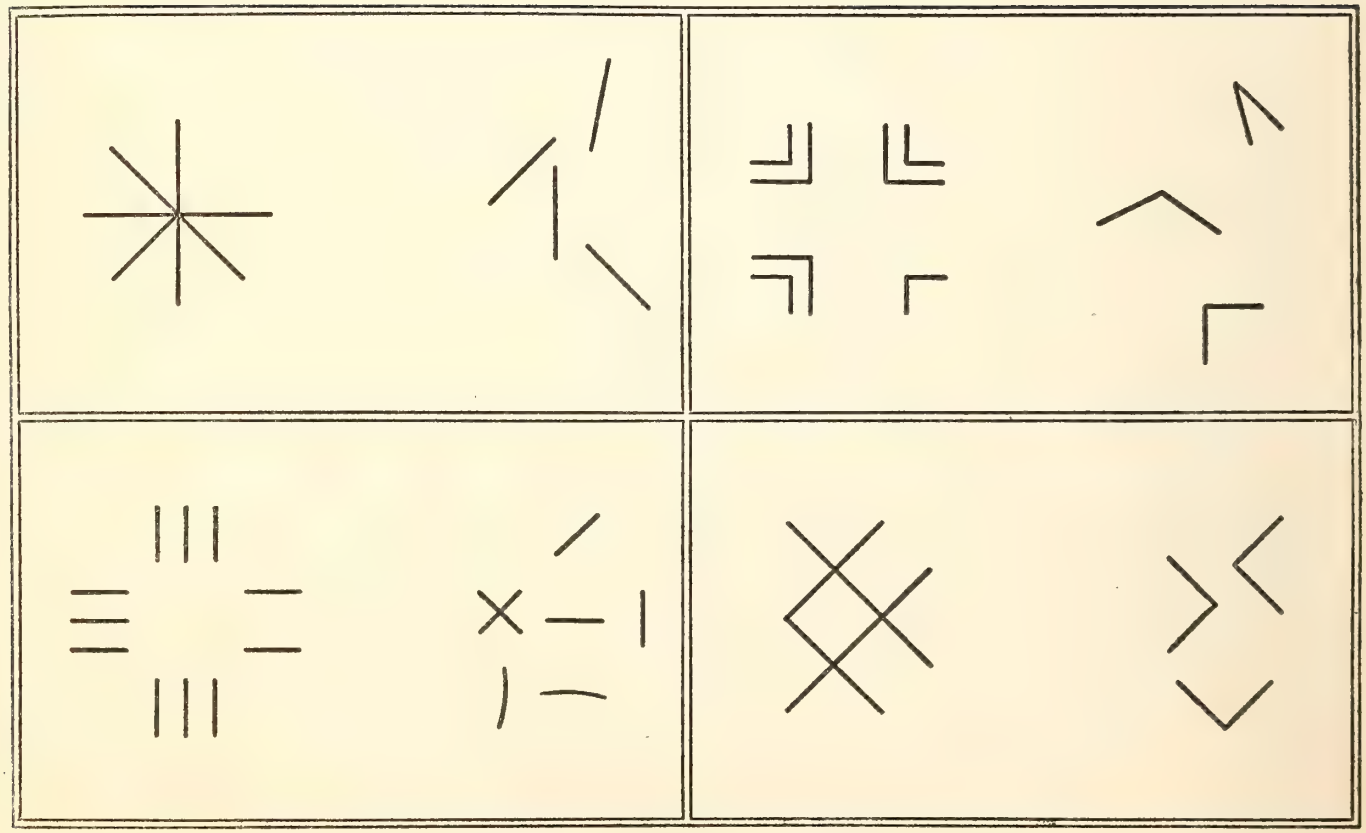


Total number right..... *Total number wrong*..... *Score* $\left(\frac{R-W}{2}\right)$.....





TEST 6 (*Continued*)



Score.....

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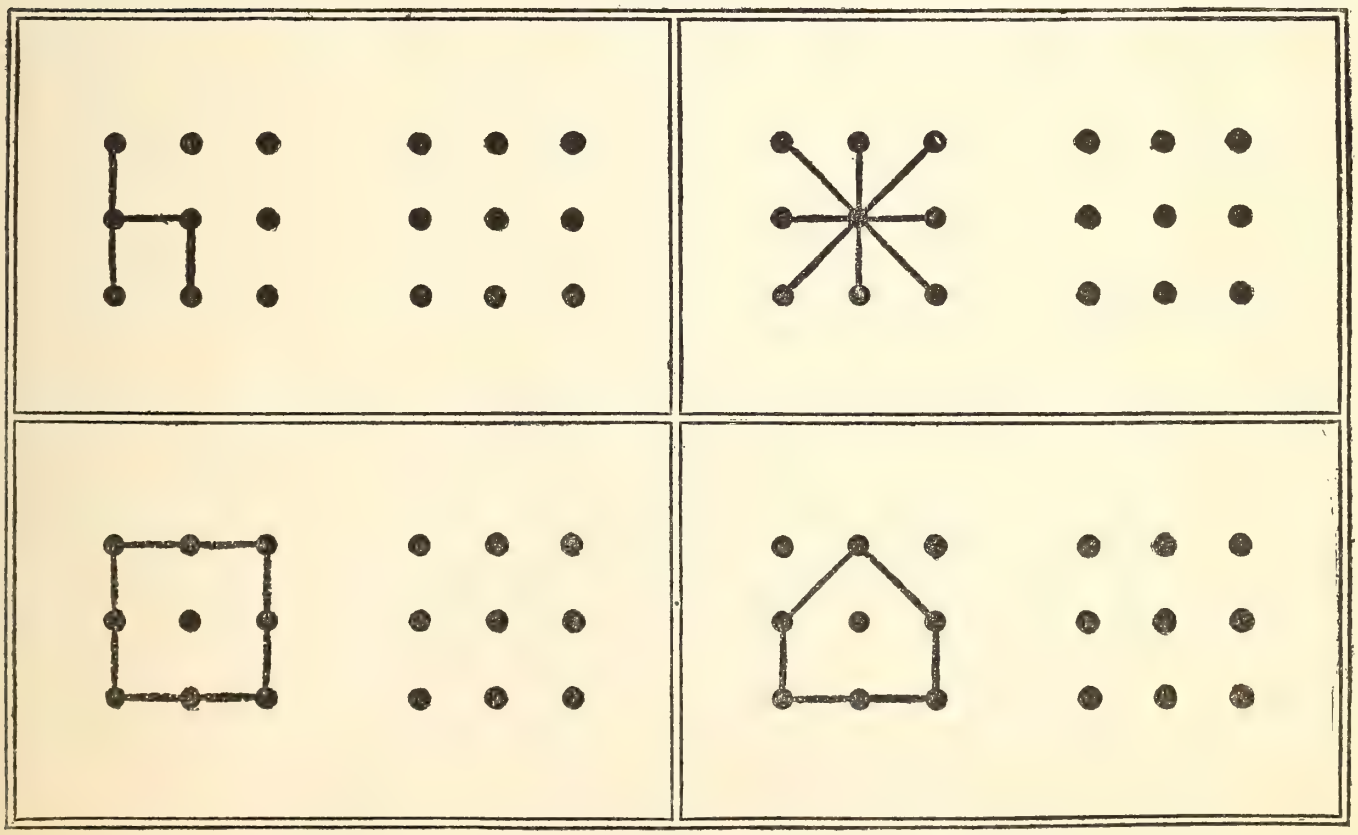

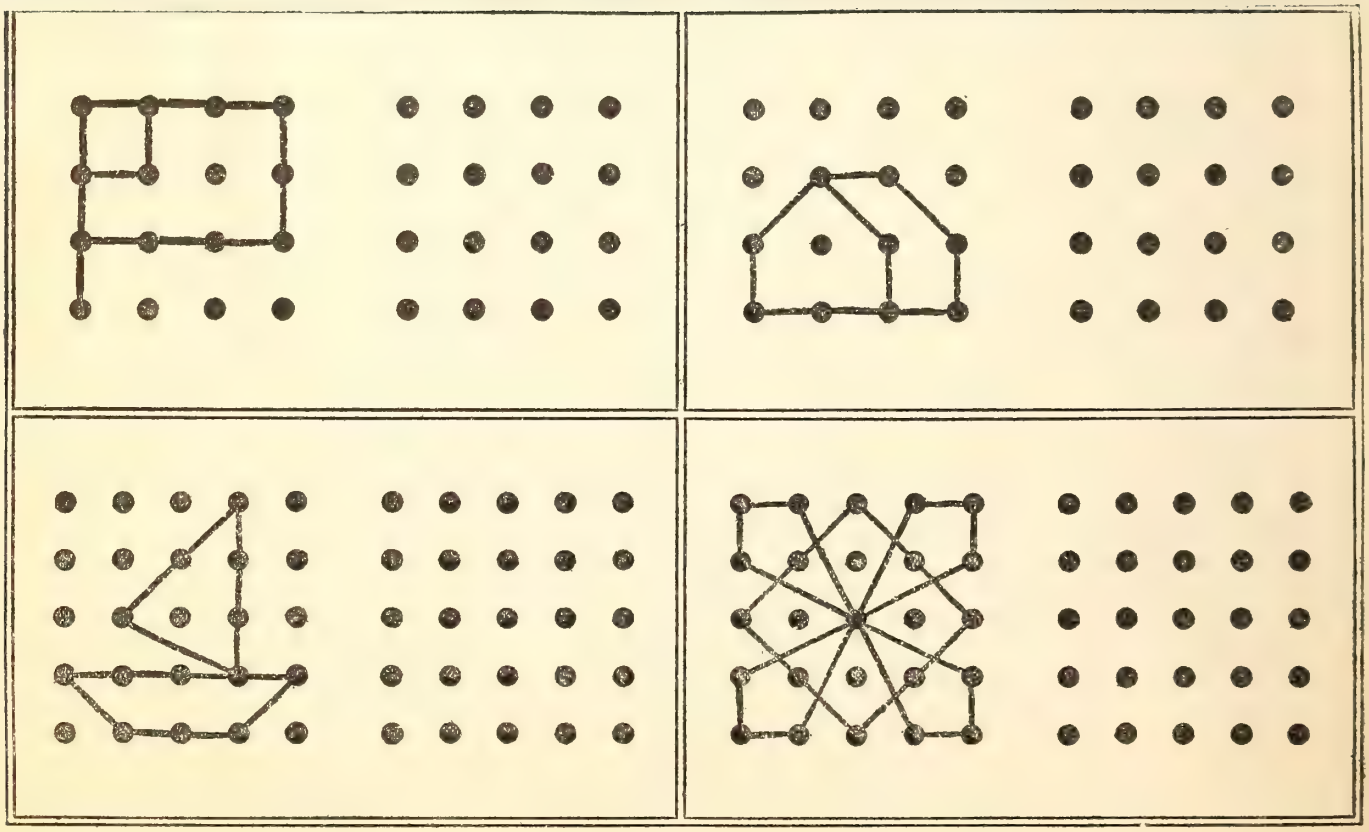

Score.....

OTIS CLASSIFICATION TEST

By Arthur S. Otis, Ph.D.

EXAMINATION: FORM A

For Grades 4–8

See Manual in re this table			
Test	I	II	Total
Score			
Norm			
Difference			CI ↓
To or from	100	100	
EQ & IQ			

Read this page. Do what it tells you to do.

Do not open this paper, or turn it over, until you are told to do so. Fill these blanks, giving your name, age, birthday, etc. Write plainly.

Name..... (First name, initial, and last name) .....Age last birthday.....years

Birthday..... (Month) (Day) .....Teacher.....Date.....192...

Grade.....School.....City.....

This is a test to see how much you have learned and how well you can think. It contains questions of different kinds. Here is a sample question already answered correctly. Notice how the question is answered:

Sample: Which one of the five words below is wrongly spelled?

1 the, 2 when, 3 wil, 4 same, 5 and. . . . . (3)

The word that is wrongly spelled is "wil"; so the word "wil" is underlined. And the word "wil" is No. 3; so a figure 3 is placed in the parentheses at the end of the dotted line. This is the way you are to answer the questions.

Try this sample question yourself. Do not write the answer; just draw a line under it and then put its number in the parentheses:

Sample: Which one of the five words below tells what an apple is?

1 flower, 2 tree, 3 vegetable, 4 fruit, 5 animal. . . . . ( )

The right answer, of course, is "fruit"; so you should have drawn a line under the word "fruit" and put a figure 4 in the parentheses. Now try this one:

Sample: Which one of the five things below is round?

1 a book, 2 a brick, 3 a ball, 4 a house, 5 a box. . . . . ( )

The answer, of course, is "a ball"; so you should have drawn a line under the words "a ball" and put a figure 3 in the parentheses. Try this one:

Sample: At four cents each, how many cents will 6 pencils cost? . . . . . ( )

The answer, of course, is 24, and there is nothing to underline; so just put the 24 in the parentheses.

If the answer to any question is a number, put the number in the parentheses without underlining anything.

This examination is in two parts. You will take only Part I just now. Part I contains 115 questions and covers four pages. You will be allowed thirty minutes for this part, after the examiner tells you to begin. You are not expected to be able to answer all the questions, but do the best you can. Try to get as many right as possible. Be careful not to go so fast that you make mistakes. Do not spend too much time on any one question. No questions about the test will be answered by the examiner after the test begins. Lay your pencil down. *Do not turn this page until you are told to begin.*

Directions for Part II

You will be allowed half an hour for Part II. It contains 75 questions and covers three pages. You are not expected to be able to answer all the questions, but do the best you can. Try to get as many right as possible. If the answer to any question is a letter, put the letter in the parentheses without underlining anything. Make all letters like printed capitals. *Wait for the signal to begin.*

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PART I

BEGIN HERE.

Put the number of the right answer here.

(Do not write on these dotted lines.)

1. Which is wrongly spelled?
   1 evening, 2 histry, 3 speak, 4 fair, 5 subject ..... ( )
2. Which word is wrongly spelled?
   1 eight, 2 restrain, 3 afrade, 4 uncle, 5 fourth ..... ( )
3. Which word is wrongly spelled?
   1 accept, 2 capture, 3 inspect, 4 bridge, 5 doller ..... ( )
4. Which word is wrongly spelled?
   1 gentleman, 2 primary, 3 property, 4 terrable, 5 final ..... ( )
5. Which word is wrongly spelled?
   1 beautiful, 2 repare, 3 trouble, 4 flight, 5 importance ..... ( )
6. Which is wrong?
   1 She lost the book. 2 He wrote a letter. 3 You hadn't ought to do it ..... ( )
7. How many complete sentences are there in the following?
   Let Harry carry the apples I will carry the milk you may carry the bread ..... ( )
8. Which is wrong?
   1 He couldn't hardly do it. 2 No one is here but me. 3 Many people like meat ..... ( )
9. Which is wrong?
   1 I wish I were there. 2 I don't want no more to eat. 3 Both of us are going ..... ( )
10. Which is wrong?
    1 Whom did you see? 2 That is all the tighter I can get it. 3 He can sing better than she ..... ( )
11. A man borrowed $450 and later paid back $200. How many dollars did he still owe? ..... ( )
12. How many miles can a train go in 5 hours at the rate of 40 miles an hour? ..... ( )
13. A rectangular room is 12 feet long and 10 feet wide. How many square feet of floor space does it contain? ..... ( )
14. If 2 pencils cost 5 cents, how many pencils can be bought for 50 cents? ..... ( )
15. If you knew the number of trees in an orchard and the number of rows of trees, to find the number of trees in each row you should (?)
    1 add, 2 subtract, 3 multiply, 4 divide ..... ( )
16. Which of these states produces the most coal?
    1 Maine, 2 Pennsylvania, 3 Kentucky, 4 Utah, 5 West Virginia ..... ( )
17. The Pyramids are in (?)
    1 Egypt, 2 Italy, 3 Greece, 4 Turkey, 5 Switzerland ..... ( )
18. The days are longest in (?)
    1 April, 2 June, 3 August, 4 October ..... ( )
19. If I stand facing north and turn "right face," I shall then face (?)
    1 south, 2 east, 3 west, 4 north ..... ( )
20. The largest continent is (?)
    1 North America, 2 South America, 3 Europe, 4 Asia, 5 Africa ..... ( )
21. Gibraltar is on the coast of (?)
    1 Spain, 2 Portugal, 3 France, 4 Italy, 5 Greece ..... ( )
22. February 22 is (?)
    1 Thanksgiving, 2 Christmas, 3 Flag Day, 4 Memorial Day, 5 Washington's Birthday ..... ( )
23. The cotton gin was invented by (?)
    1 Thomas Edison, 2 Benjamin Franklin, 3 Eli Whitney, 4 Robert Fulton, 5 Samuel Morse ..... ( )
24. The Declaration of Independence was signed in (?) (Tell by letter.)
    A 1820, B 1765, C 1812, D 1850, E 1776 ..... ( )
25. The members of the Cabinet are chosen by (?)
    1 the people, 2 Congress, 3 the President, 4 the state legislatures ..... ( )
26. What official of a city corresponds to the governor of a state?
    1 the mayor, 2 the judge, 3 the city attorney, 4 the city clerk, 5 the chief of police ( )
27. Which one of the following men was prominent in the Colonial period?
    1 Nathan Hale, 2 William Penn, 3 John Cabot, 4 Paul Revere, 5 Daniel Webster .. ( )

Do not stop. Go right on to the next page.

28. When we breathe, air is taken into the (?)
1 stomach, 2 heart, 3 lungs, 4 liver, 5 brain ( )

29. A knuckle is a part of the (?)
1 leg, 2 hand, 3 thigh, 4 hip, 5 neck ( )

30. All the following are necessary to the body except (?)
1 proteins, 2 carbohydrates, 3 fats, 4 minerals, 5 toxins ( )

31. The thyroid gland is in the (?)
1 chest, 2 abdomen, 3 neck, 4 head, 5 leg ( )

32. The story of "Rip Van Winkle" tells about (?)
1 Bois-Guilbert, 2 Tom Canty, 3 Marley's Ghost, 4 Old Stony Phiz, 5 Kaatskill Mountains ( )

33. "The Legend of Sleepy Hollow" tells about (?)
1 Captain Smollet, 2 Ichabod Crane, 3 Miles Henderson, 4 Scrooge, 5 Queen Dolores ( )

34. "Antique" means about the same as (?)
1 shabby, 2 inferior, 3 ancient, 4 original, 5 peculiar ( )

35. "To congregate" means about the same as (?)
1 to assemble, 2 to dismiss, 3 to applaud, 4 to confirm, 5 to contradict ( )

36. "To repress" means about the same as (?)
1 to press hard, 2 to hurry, 3 to require, 4 to restrain, 5 to press forward ( )

37. Ivory is obtained from (?)
1 trees, 2 mines, 3 tusks, 4 hoofs, 5 bones ( )

38. The letters "C. O. D." refer to (?)
1 fish, 2 paying for goods, 3 a state, 4 a secret society, 5 an officer ( )

39. The United States Military Academy is at (?)
1 Poughkeepsie, 2 West Point, 3 Annapolis, 4 Boston, 5 New York ( )

40. Mica is a (?)
1 mineral, 2 gas, 3 liquid, 4 vegetable, 5 animal product ( )

41. The term "soviet" refers to (?)
1 government, 2 finance, 3 war, 4 business, 5 transportation ( )

42. The armadillo is a kind of (?)
1 plant, 2 animal, 3 bird, 4 fish, 5 insect ( )

43. Red and yellow paints mixed make (?) paint.
1 green, 2 blue, 3 purple, 4 pink, 5 orange ( )

44. The clarinet is used in (?)
1 farming, 2 tennis, 3 music, 4 hunting, 5 fishing ( )

45. Beethoven is best known as (?)
1 a composer, 2 a poet, 3 a dramatist, 4 an actor, 5 a statesman ( )

46. The key of E flat has how many flats? ( )

47. Write in figures the sum of six, four, and three ( )

48. $25 - 9 = (?)$ ( )

49. $6 \times 9 = (?)$ ( )

50. $56 \div 8 = (?)$ ( )

51.
52.
53.

A	B	C	D
Add	Subtract	Multiply	Divide
86	10468	3685	993
24	7531	7	8)7952
57	3937	21795	
31			
188	All these answers are wrong.		

51. One figure is wrong in the answer to the addition problem at A. What should that one figure be? ( )

52. One figure is wrong in the answer to the subtraction problem at B. What should that figure be? ( )

53. One figure is wrong in the answer to the multiplication problem at C. What should that figure be? ( )

54. One figure is wrong in the answer to the division problem at D. What should that figure be? ( )

55. 25 lb., 4 oz. + 4 lb., 12 oz. = (?) lb. ( )

56. Which word is wrongly spelled?
1 estimate, 2 accident, 3 volume, 4 impossible, 5 deside ( )

Do not stop. Go right on to the next page.

57. Which word is wrongly spelled?
1 century, 2 assist, 3 perticular, 4 total, 5 difference ( )

58. Which word is wrongly spelled?
1 machine, 2 success, 3 avenue, 4 entertain, 5 visiter ( )

59. Which is wrong?
1 I don't know whom you mean. 2 He gave some of the fish to Harold and I. 3 Who will go if you don't? ( )

60. Which is wrong?
1 He sat in a chair. 2 His arm was broke. 3 How do you know? 4 We all came home. ( )

61. Which is wrong?
1 I will go too. 2 We lost our way. 3 Let me do it for you. 4 He did very good ( )

62. Which is wrong?
1 We are both older than he. 2 I have got a bad cold. 3 We all went home together ( )

63. A man had a certain sum in the bank last year. He has a certain larger sum this year. To find how much he has saved during the year you should (?)
1 add, 2 subtract, 3 multiply, 4 divide ( )

64. A bus makes a certain number of trips a day over the same road. Each trip is a certain number of miles. To find the total number of miles traveled per day you should (?)
1 add, 2 subtract, 3 multiply, 4 divide ( )

65. If $2\frac{1}{2}$ yards of cloth cost 20 cents, how many cents will 10 yards cost? ( )

66. A portion of land almost surrounded by water is called (?)
1 a bay, 2 an island, 3 a lake, 4 a cape, 5 a peninsula ( )

67. Which of these countries does not touch France?
1 Spain, 2 Italy, 3 Germany, 4 Russia, 5 Belgium ( )

68. Which of these states is nearest Illinois?
1 Missouri, 2 North Dakota, 3 Pennsylvania, 4 Colorado, 5 Virginia ( )

69. Which of these is an island?
1 Afghanistan, 2 Siam, 3 India, 4 Madagascar, 5 Siberia ( )

70. Coral is obtained from (?)
1 laboratories, 2 elephants, 3 mines, 4 reefs, 5 oysters ( )

71. The Panama Canal was begun in the administration of (?)
1 Cleveland, 2 McKinley, 3 Roosevelt, 4 Taft, 5 Wilson ( )

72. In what document are these words: "all men are created equal"?
1 Constitution of the United States, 2 Declaration of Independence, 3 Emancipation Proclamation ( )

73. Which one of the following men was prominent in the Revolutionary period?
1 Henry Clay, 2 Benedict Arnold, 3 Grant, 4 Sir Walter Raleigh, 5 Andrew Jackson ( )

74. The legislative body of a city is usually called the (?)
1 legislature, 2 council, 3 mayor, 4 senate, 5 court ( )

75. A vertebra is part of (?)
1 the spinal column, 2 the head, 3 a nerve, 4 a muscle, 5 a hand ( )

76. The blood is carried from the heart in the (?)
1 veins, 2 arteries, 3 capillaries, 4 glands, 5 nerves ( )

77. The story of "The Dutch Twins" tells about (?)
1 Topsy, 2 Heidi, 3 Albrecht and Christof, 4 Hans and Gretel, 5 Kit and Kat ( )

78. "Reverence" means about the same as (?)
1 veneration, 2 inference, 3 revelry, 4 deference, 5 gratitude ( )

79. "Legitimate" means about the same as (?)
1 intimate, 2 lawful, 3 legislative, 4 lucrative, 5 infinite ( )

80. Which of the following combinations of colors makes the best contrast?
1 red and pink, 2 blue and green, 3 blue and purple, 4 blue and orange ( )

81. Emeralds are usually (?)
1 red, 2 blue, 3 yellow, 4 green, 5 orange ( )

82. The "wigglers" often found in stagnant water will turn into (?)
1 fleas, 2 house flies, 3 mosquitoes, 4 moths, 5 butterflies ( )

83. "Larceny" is a term used in (?)
1 agriculture, 2 theology, 3 medicine, 4 law, 5 sport ( )

84. Which of the following statements is false?
1 Air has no weight. 2 Ice is lighter than water. 3 Friction produces heat ( )

85. *Sol* in the key of C is *do* in the key of (?) ( )

Do not stop. Go right on to the next page.

86. $\frac{3}{4} \div \frac{3}{8} = (?)$ ( )

87. .24 ÷ .6 = (?) (Tell by letter.)
A 4. B .4 C .04 D .004 E .0004 ( )

88. 25% of 8 = (?) ( )

89. 27 sq. ft. = (?) sq. yd. ( )

90. The prime factors of 30 are 2, 3, and (?) ( )

91. The square root of 64 = (?) ( )

92. Which word is wrongly spelled?
1 necessary, 2 agreement, 3 distinguish, 4 assure, 5 foriegn ( )

93. Which word is wrongly spelled?
1 seperate, 2 extreme, 3 organization, 4 appreciate, 5 practical ( )

94. Which is wrong?
1 He did it as quick as he could. 2 George and I were there. 3 Who would have thought so? ( )

95. Which is wrong?
1 He could hardly wait. 2 If she was here, we could ask her. 3 They don't like to work. ( )

96. Which is wrong?
1 He studied his lesson. 2 I wish I was in Dixie. 3 The clock had run down ( )

97. At 6% per annum, what will be the interest on $200 for 3 years? ( )

98. A dealer sells trombones at $50 each, having bought them of the manufacturer at a discount of 60% of this selling price. How many dollars does each trombone cost the dealer? ( )

99. Which of these states is the most mountainous?
1 Arizona, 2 Colorado, 3 Nebraska, 4 Illinois, 5 Indiana ( )

100. In how many days does the earth make one complete revolution about the sun? ( )

101. When it is 12 o'clock in New York, what time is it in Chicago? ( )

102. The Monroe Doctrine was (?)
1 an expression of resentment against taxation without representation, 2 a declaration of war, 3 a warning to the European nations to refrain from colonizing in the Western Hemisphere, 4 a warning against entangling alliances, 5 a treaty with Great Britain ( )

103. The initiative and referendum have to do with (?)
1 legislation, 2 bargaining, 3 commerce, 4 banking, 5 war ( )

104. The President of the United States is technically chosen by the (?)
1 state legislatures, 2 people, 3 electoral college, 4 Senate, 5 Cabinet ( )

105. The medulla oblongata is part of the (?) system.
1 digestive, 2 circulatory, 3 nervous, 4 respiratory, 5 glandular ( )

106. The story of "Rebecca of Sunnybrook Farm" tells about (?)
1 Mr. Aladdin, 2 Lobo, 3 Carol Bird, 4 Miss Ophelia, 5 Queen Dolores ( )

107. "To deplete" means about the same as (?)
1 to deprecate, 2 to exhaust, 3 to deplore, 4 to complete, 5 to deny ( )

108. Rosa Bonheur was famous as a (?)
1 sculptor, 2 actress, 3 poet, 4 painter, 5 singer ( )

109. Samuel Gompers was best known as a (?)
1 mine owner, 2 labor leader, 3 senator, 4 governor, 5 journalist ( )

110. A circle viewed obliquely appears as (?)
1 a smaller circle, 2 a straight line, 3 an ellipse, 4 a cylinder, 5 egg-shaped ( )

111. It rains whenever (?)
1 saturated air is warmed, 2 saturated air is cooled, 3 there is a strong wind, 4 the ocean evaporates ( )

112. The lowest line in the treble clef is *do* in the key of (?) ( )

113. 12 : 4 : : 6 : (?) ( )

114. Express CXVI in Arabic figures ( )

115. The circumference of a circle = (?) (Tell by letter.)
A (π) B (π^2) C $(2\pi r)$ D (πr^2) E $(2\pi r^2)$ ( )

End of Part I. Stop here. Go back and see that all your answers are right.

52. If a man has walked west from his home 9 blocks and then walked east 4 blocks, how many blocks is he from his home? ( )

53. A pitcher is to milk as (?) is to flowers.
1 stem, 2 leaves, 3 water, 4 vase, 5 roots ( )

54. Do what this mixed-up sentence tells you to do.
sum three write two the four and of ( )

55. There is a saying, "Don't count your chickens before they are hatched." This means (?)
1 Don't hurry. 2 Don't be too sure of the future. 3 Haste makes waste. 4 Don't gamble ( )

56. Which statement tells best just what a fork is?
1 a thing to carry food to the mouth, 2 It goes with a knife, 3 an instrument with prongs at the end, 4 It goes on the table, 5 It is made of silver ( )

57. Wood is to a table as (?) is to a knife.
1 cutting, 2 chair, 3 fork, 4 steel, 5 handle ( )

58. Do what this mixed-up sentence tells you to do.
sentence the letter write last this in ( )

59. Which one of the words below would come last in the dictionary?
1 alike, 2 admit, 3 amount, 4 across, 5 after, 6 amuse, 7 adult, 8 affect ( )

60. There is a saying, "He that scatters thorns, let him go barefoot." This means (?)
1 Let him who causes others discomforts bear them himself also. 2 Going barefoot toughens the feet. 3 People should pick up what they scatter. 4 Don't scatter things around ( )

61. If the following words were arranged in order, with what letter would the middle word begin?
Plaster Frame Wallpaper Lath Foundation ( )

62. In a foreign language,
many boys = Boka Hepo
many girls = Marti Hepo
many boys and girls = Boka Ello Marti Hepo
The word that means *and* begins with what letter? ( )

63. A statement which expresses just the opposite of that which another statement expresses is said to be a (?)
1 lie, 2 contradiction, 3 falsehood, 4 correction, 5 explanation ( )

64. There is a saying, "Don't look a gift horse in the mouth." This means (?)
1 It is not safe to look into the mouth of a horse. 2 Although you question the value of a gift, accept it graciously. 3 Don't accept a horse as a gift. 4 You cannot judge the age of a gift horse by his teeth ( )

65. Which one of the words below would come last in the dictionary?
1 hedge, 2 glory, 3 label, 4 green, 5 linen, 6 knife, 7 honor ( )

66. Which statement tells best just what a watch is?
1 It ticks, 2 something to tell time, 3 a small, round object with a chain, 4 a vest-pocket-sized time-keeping instrument, 5 something with a face and hands ( )

67. Ice is to water as water is to what?
1 land, 2 steam, 3 cold, 4 river, 5 thirst ( )

68. Which statement tells best just what a window is?
1 something to see through, 2 a glass door, 3 a frame with a glass in it, 4 a glass opening in the wall of a house, 5 a piece of glass surrounded by wood ( )

69. Which of the five words below is most like these three: large, red, good?
1 heavy, 2 size, 3 color, 4 apple, 5 very ( )

70. Write the letter that follows the letter that comes next after M in the alphabet ( )

71. One number is wrong in the following series. What should that number be?
1 2 4 8 16 24 64 ( )

72. An uncle is to an aunt as a son is to a (?)
1 brother, 2 daughter, 3 sister, 4 father, 5 girl ( )

73. If I have a large box with 3 small boxes in it and 4 very small boxes in each of the small boxes, how many boxes are there in all? ( )

74. One number is wrong in the following series. What should that number be?
1 2 4 5 7 8 10 11 12 14 ( )

75. There is a saying, "Don't ride a free horse to death." This means (?)
1 Don't be cruel. 2 Don't abuse a privilege. 3 Don't accept gifts. 4 Don't be reckless. ( )

If you finish before the time is up, go back and make sure that every answer is right.

27. If George is older than Frank, and Frank is older than James, then George is (?) James.
1 older than, 2 younger than, 3 just as old as, 4 (cannot say which)..... ( )

28. Count each 7 below that has a 5 next after it. Tell how many 7's you count.
7 5 3 0 9 7 3 7 8 5 7 4 2 1 7 5 7 3 2 4 7 0 9 3 7 5 5 7 2 3 5 7 7 5 4 7..... ( )

29. If the words below were rearranged to make a good sentence, with what letter would the last word of the sentence begin? (Make the letter like a printed capital.)
leather shoes usually made are of..... ( )

30. An electric light is to a candle as a motorcycle is to (?)
1 bicycle, 2 automobile, 3 wheels, 4 speed, 5 police..... ( )

31. Which one of the words below would come first in the dictionary?
1 march, 2 ocean, 3 horse, 4 paint, 5 elbow, 6 night, 7 flown..... ( )

32. The daughter of my mother's brother is my (?)
1 sister, 2 niece, 3 cousin, 4 aunt, 5 granddaughter..... ( )

33. One number is wrong in the following series. What should that number be?
3 4 5 4 3 4 5 4 3 5..... ( )

34. Which of the five things below is most like these three: boat, horse, train?
1 sail, 2 row, 3 motorcycle, 4 move, 5 track..... ( )

35. If Paul is taller than Herbert and Paul is shorter than Robert, then Robert is (?) Herbert.
1 taller than, 2 shorter than, 3 just as tall as, 4 (cannot say which)..... ( )

36. What is the most important reason that we use clocks?
1 to wake us up in the morning, 2 to regulate our daily lives, 3 to help us catch trains, 4 so that children will get to school on time, 5 They are ornamental..... ( )

37. A coin made by an individual and meant to look like one made by the government is called (?)
1 duplicate, 2 counterfeit, 3 imitation, 4 forgery, 5 libel..... ( )

38. A wire is to electricity as (?) is to gas.
1 a flame, 2 a spark, 3 hot, 4 a pipe, 5 a stove..... ( )

39. If the following words were arranged in order, with what letter would the middle word begin?
Yard Inch Mile Foot Rod..... ( )

40. One number is wrong in the following series. What should that number be?
5 10 15 20 25 29 35 40 45 50..... ( )

41. Which word means the opposite of truth?
1 cheat, 2 rob, 3 liar, 4 ignorance, 5 falsehood..... ( )

42. Order is to confusion as (?) is to war.
1 guns, 2 peace, 3 powder, 4 thunder, 5 army..... ( )

43. In a foreign language, good food = Bano Naab
good water = Heto Naab
The word that means *good* begins with what letter?..... ( )

44. The feeling of a man for his children is usually (?)
1 affection, 2 contempt, 3 joy, 4 pity, 5 reverence..... ( )

45. Which of the five things below is most like these three: stocking, flag, sail?
1 shoe, 2 ship, 3 staff, 4 towel, 5 wash..... ( )

46. A book is to information as (?) is to money.
1 paper, 2 dollars, 3 bank, 4 work, 5 gold..... ( )

47. If Harry is taller than William, and William is just as tall as Charles, then Charles is (?) Harry.
1 taller than, 2 shorter than, 3 just as tall as, 4 (cannot say which)..... ( )

48. If the following words were arranged in order, with what letter would the middle word begin?
Six Ten Two Eight Four..... ( )

49. If the words below were rearranged to make a good sentence, with what letter would the third word of the sentence begin? (Make the letter like a printed capital.)
men high the a wall built stone..... ( )

50. If the suffering of another makes us suffer also, we feel (?)
1 worse, 2 harmony, 3 sympathy, 4 love, 5 repelled..... ( )

51. In a foreign language, grass = Moki
green grass = Moki Laap
The word that means *green* begins with what letter?..... ( )

Do not stop. Go on to the next page.

PART II

BEGIN HERE.

1. Which one of the five things below does not belong with the others? (Do not write on these dotted lines.)
   1 potato, 2 turnip, 3 carrot, 4 stone, 5 onion ..... ( )
2. Which one of the five words below tells best what a saw is?
   1 something, 2 tool, 3 furniture, 4 wood, 5 machine ..... ( )
3. Which one of the five words below means the opposite of west?
   1 north, 2 south, 3 east, 4 equator, 5 sunset ..... ( )
4. A hat is to a head and a glove is to a hand the same as a shoe is to what?
   1 leather, 2 a foot, 3 a shoestring, 4 walk, 5 a toe ..... ( )
5. A child who knows he is guilty of doing wrong should feel (?)
   1 bad, 2 sick, 3 better, 4 afraid, 5 ashamed ..... ( )
6. Which one of the five things below is the smallest?
   1 twig, 2 limb, 3 bud, 4 tree, 5 branch ..... ( )
7. Which one of the five things below is most like these three: cup, plate, saucer?
   1 fork, 2 table, 3 eat, 4 bowl, 5 spoon ..... ( )
8. Which one of the five words below means the opposite of strong?
   1 man, 2 weak, 3 small, 4 short, 5 thin ..... ( )
9. A finger is to a hand the same as a toe is to what?
   1 foot, 2 toenail, 3 heel, 4 shoe, 5 knee ..... ( )
10. Which word means the opposite of sorrow?
    1 sickness, 2 health, 3 good, 4 joy, 5 pride ..... ( )
11. Which one of the ten numbers below is the smallest? (Tell by letter.)
    A 6084, B 5160, C 4342, D 6521, E 9703, F 4296, G 7475, H 2657, J 8839, K 3918 ( )
12. Which word means the opposite of pretty?
    1 good, 2 ugly, 3 bad, 4 crooked, 5 nice ..... ( )
13. Do what this mixed-up sentence tells you to do.
    number write the the in 5 parentheses ..... ( )
14. If we believe some one has committed a crime, but we are not sure, we have a (?)
    1 fear, 2 suspicion, 3 wonder, 4 confidence, 5 doubtful ..... ( )
15. A book is to an author as a statue is to a (?)
    1 sculptor, 2 marble, 3 model, 4 magazine, 5 man ..... ( )
16. Which is the most important reason that words in the dictionary are arranged alphabetically?
    1 That is the easiest way to arrange them. 2 It puts the shortest words first. 3 It enables us to find any word quickly. 4 It is merely a custom. 5 It makes the printing easier ... ( )
17. Which one of the five things below is most like these three: plum, apricot, apple?
    1 tree, 2 seed, 3 peach, 4 juice, 5 ripe ..... ( )
18. At 4 cents each, how many pencils can be bought for 36 cents? ..... ( )
19. If a person walking in a quiet place suddenly hears a loud sound, he is likely to be (?)
    1 stopped, 2 struck, 3 startled, 4 made deaf, 5 angered ..... ( )
20. A boy is to a man as a (?) is to a sheep.
    1 wool, 2 lamb, 3 goat, 4 shepherd, 5 dog ..... ( )
21. One number is wrong in the following series. What should that number be? (Just write the correct number in the parentheses.)
    1 6 2 6 3 6 4 6 5 6 7 6 ..... ( )
22. Which of the five things below is most like these three: horse, pigeon, cricket?
    1 stall, 2 saddle, 3 eat, 4 goat, 5 chirp ..... ( )
23. If the words below were rearranged to make a good sentence, with what letter would the last word of the sentence begin? (Make the letter like a printed capital.)
    nuts from squirrels trees the gather ..... ( )
24. A man who betrays his country is called a (?)
    1 thief, 2 traitor, 3 enemy, 4 coward, 5 slacker ..... ( )
25. Food is to the body as (?) is to an engine.
    1 wheels, 2 fuel, 3 smoke, 4 motion, 5 fire ..... ( )
26. Which tells best just what a pitcher is?
    1 a vessel from which to pour liquid, 2 something to hold milk, 3 It has a handle, 4 It goes on the table, 5 It is easily broken ..... ( )

Do not stop. Go on to the next page.

OTIS CLASSIFICATION TEST

By Arthur S. Otis, Ph.D.

MANUAL OF DIRECTIONS

CONTENTS

		PAGE
I.	Introduction	1
II.	Special Features	1
III.	Directions for Administering	2
IV.	Directions for Scoring	2
V.	Interpretation of Results	3
VI.	Standardization	9
VII.	School Reorganization	10
VIII.	The Percentile Graph	12
IX.	Reliability and Validity	13

I. INTRODUCTION

In this Manual will be found the complete directions for administering and scoring the Otis Classification Test, directions for interpreting the scores in the light of the educational problems that the tests will help solve, and directions for applying the results of the test to the solution of those problems.

Nature of the test. The Otis Classification Test is a combination of an Achievement Test (Part I) and a Mental Ability Test (Part II). The Mental Ability Test is the Intermediate Examination of the Otis Self-Administering Tests of Mental Ability.[1] The Achievement Test consists of a list of 115 questions covering reading, spelling, grammar and diction, arithmetic reasoning and fundamental operations, geography, history and civics, physiology and hygiene, literature, vocabulary, music, art, and general information. (See Tables 1 and 6.) The questions of the Mental Ability Test were so selected that ability to answer them would depend as little as possible upon school training, while those of the Achievement Test were selected as depending almost altogether upon school training.

Scope. The test is designed for Grades 4 to 8. It is applicable to the 9th grade, and it has been administered successfully in the 3d grade.

Forms. The test is furnished in three alternative forms, A, B, and C, alike in make-up and of equal difficulty, but differing in the questions asked.

Time limits. The pupil is allowed 30 minutes of continuous working time for each part of the test. It is possible, therefore, to test both the achievement and the mental ability of a group of pupils in a little over one hour.

[1] Published by World Book Company, Yonkers-on-Hudson, New York.

II. SPECIAL FEATURES

Both achievement and mental ability measured. Since the test combines the measurement of both achievement and mental ability, and since the norms for the Achievement Test and Mental Ability Test are based upon the same data and are directly comparable, it is possible to obtain an Accomplishment Ratio (or Quotient) which is not subject to the errors arising when the achievement test and the mental ability test are separately standardized.

Self-administration. The Otis Classification Test is built upon the same principles as the Otis Self-Administering Tests of Mental Ability. The questions in the Achievement Test are answered in the same way as those in the Mental Ability Test. All the directions the pupil needs are printed on the first page of the test booklet. The examiner has only to distribute the blanks, see that all understand the printed directions, and give the signal to begin. He may then leave the class in charge of an assistant. Only ten minutes of the examiner's time is needed to each room tested.

Simplified scoring. Provision is made in both the Achievement Test and the Mental Ability Test for the responses to be placed in a single column at the edge of each page. This arrangement precludes the danger of overlooking a response and enables comparison between responses and key to be made very rapidly and yet accurately. Every answer is either right or wrong. No judgment is necessary on the part of the scorer. No partial credits are given. Each correct answer counts one point. The scoring is simple and rapid.

Cycle form. The Achievement Test is arranged in the so-called cycle form. The pupil is first given an opportunity to try the easy items in all the subjects, then the items of medium difficulty, then the difficult ones. (See Table 6.) The form of the test admits of the use of a wide variety of types of questions in the Mental Ability Test and of subjects covered in the Achievement Test.

Interpretation Chart. A chart is provided upon which the scores of a class or school may be plotted and the pupils regraded or divided into fast-moving, regular, and slow-moving groups or both, merely by drawing lines on the chart. It is not necessary to use the Interpretation Chart in order to interpret scores in the test, but it will be found a distinct aid and convenience.

Ease of figuring Classification Index. A new measure that corresponds to the average between the IQ and EQ, called the Classification Index, can be found for any

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pupil from his score and age by means of the Interpretation Chart without any computation or reference to a book of tables.

Diagnosis. Provision is made for comparing the abilities of a pupil in the separate school subjects, in order to determine wherein he may be weak.

Reliability and validity. The probable error of the test is only 5 points out of a possible 190. The correlation between the test and the combined mental and educational age from eight mental and educational tests is over .95.

III. DIRECTIONS FOR ADMINISTERING

Who may administer. Any superintendent, principal, or teacher after a little preparation can satisfactorily administer the test. The best preparation for administering it is to take it. The principal should invite his teachers to take the test and score their own papers. Any teacher who is interested in scientific methods in the classroom will welcome the opportunity to experience the taking of the test, as this will give her the best appreciation of what the test measures. Those administering a test of this kind should realize that it is very important that conditions be uniform throughout the school and must be the same in the school being tested as in every other school where the test has been given. For this reason, everything that needs to be said in administering the test is given below in boldface type, and the teacher should give these instructions verbatim, reading if necessary. If one teacher urges the students to work as rapidly as possible and another teacher urges them to work as carefully as possible, the results may be entirely different and not comparable. The teacher, therefore, should say nothing that is not prescribed, except to make clear the meaning of what is on the first page of the test blank.

When to administer. The best time to give the test is probably at the opening of school in the morning, although the time of day probably does not have a serious effect upon the score.

Part II should not be given immediately after Part I. It is a good plan to arrange that at least a recess may be had between the two parts, or Part I may be given in the morning and Part II in the afternoon. If necessary, the two parts may be given on different days.

Directions for administering. To administer any form of the test, begin by addressing the pupils as follows:

"We are going to give you this morning [afternoon] some new and interesting tests. As soon as you receive a test paper you may begin to read the first page and do as it directs, filling the blanks, etc. Do not open or turn over the paper. Part of the test is to see if you can follow directions."

Have monitors pass the papers, one to each pupil, right side up. See that every pupil is supplied with two pencils (or a pen) and an eraser.

Allow a reasonable time for all to finish reading the first page and trying the samples. A few laggards may be disregarded. Then say, **" Is there any one who does not understand the first page?"** Give any explanations necessary to make sure that all understand what is explained on the first page.

Then note the exact time and say, **" Now turn over the page and begin."** Write plainly on the blackboard the starting time and stopping time.

If the principal or superintendent is administering the test, he may now leave the class in charge of the teacher, with instructions to proceed as explained below.

Give no further directions and answer no questions while the test is being taken. If a 4th or 5th grade is being tested, move quietly about the room just long enough to make sure that all are indicating the answers in the proper manner. If a pupil is found who is not placing the numbers in the parentheses, tell him to do so. Return to the front of the room as promptly as possible, and remain seated during the rest of the time.

Stop the work at the end of exactly 30 minutes. Have booklets closed and laid right side up.

If necessary to have the pupils continue the test without a recess, it is a good plan to let them stand and take a few deep breaths and calisthenics. If a recess may be had immediately, the papers may be left lying on the desks. If Part II is to be given at a later time, have the booklets collected.

When ready to pass the booklets for Part II, say, **" You will now take the rest of the test you began. When you get your paper, read the Directions for Part II at the bottom of the first page."** Have the booklets passed right side up as before. When all have finished reading, say, **" Every one look this way. Pick up your paper and turn it over from the bottom up, this way."** (Show.) **" It says, ' Begin here,' at the top. Begin."** Note the exact time. Write the starting and the stopping time on the blackboard.

Give no further directions and answer no questions. At the end of exactly 30 minutes, stop the work and have the papers collected.

IV. DIRECTIONS FOR SCORING

The correct answers to the 190 questions comprising Parts I and II of the test are given in the Key, a copy of which is included in each package of tests. Cut the Key into four strips as indicated. To score the test, place the appropriate Key over the test paper so that the column of correct answers is adjacent to the responses given on the test paper. Place a check mark after each correct answer or a cross after each incorrect or omitted answer, or both checks and crosses.

Score Part I of all the papers of a group first; then score Part II. If two or more answers are given to any one item, count the item wrong.

If a paper is found in which the pupil has omitted to place the numbers in the parentheses but has otherwise indicated the answers, the scorer should write in the parentheses the numbers representing the answers of the

pupil so far as these may be determined, and then score accordingly. In the case of any irregularity, score according to the obvious intent of the pupil. Do not deduct credit for failure to make letters like printed capitals.

The score in each part is the number of correct responses. After scoring Part I, count the correct responses and write the number on the margin opposite the last response. Then verify the score by counting the incorrect and omitted responses. Thus, suppose the number of correct responses is 60. Count the incorrect and omitted responses, beginning 61, 62, etc., and see that the total is 115. Then enter the score in the space provided on the first page of the blank and do the same for Part II. Do not trust the counting of correct responses only, as it is very easy to make a mistake. The checking of correct responses should be gone over by a second scorer to insure accurate scoring, for even the best scorers will make mistakes.

The Class Record. The scores should be entered on the Class Record which is provided with each package of tests. Before entering the scores, arrange the papers of a class either in alphabetical order or in the order of magnitude of the score, according to preference. Next, enter the name of each student and his age in years and months. Then enter his scores in Parts I and II in the proper columns and enter the Classification score (sum of scores in Parts I and II). Directions for filling the remaining columns will be given under " Interpretation of Results."

V. INTERPRETATION OF RESULTS

" Intelligence." The reader will note that in this Manual we avoid the use of the term " intelligence." This term is much abused and has caused a great deal of discussion. " Intelligence tests " have been regarded by many as being direct measures of innate, inherited mental ability, uninfluenced by environment. Nothing could be farther from the truth. It is impossible to test innate mental ability or " intelligence " directly. We can only measure the effect that environment and training have had upon it.

Part I is designed to measure the effect of *school training* upon innate mental ability. This effect is different for different amounts and quality of school training. Part II is designed to measure innate mental ability indirectly by measuring the effect upon it of those elements of their environment that are common to all children. We may think of the Achievement Test, therefore, as measuring knowledge of school subjects and the Mental Ability Test as measuring indirectly learning ability or thinking power.

Composition of the Achievement Test. Table 1 shows the number of items in each subject. Language and arithmetic are, of course, of prime importance. Arithmetic reasoning items are found in both the Achievement Test and the Mental Ability Test. Those in the Achievement Test are such as depend largely on knowledge gained in school, while those in the Mental Ability Test rest upon common experience. Reading ability is tested to a greater or less extent by every item. This is shown, for example, in the case of a pupil who answered the question, " The capital of Massachusetts begins with what letter? " by the letter M. It would seem evident that in such a case the pupil did not read the question correctly.

TABLE 1

SHOWING THE COMPOSITION OF THE ACHIEVEMENT TEST

Language	Spelling	10	
	Grammar and Diction	12	
	Vocabulary	6	
	Literature	4	32
Arithmetic	Fundamentals	18	
	Reasoning	10	28
Geography			14
History and Civics			13
Physiology and Hygiene			7
Music			5
General Information			16
Total			115

Language difficulty. The Otis Classification Test, like all so-called verbal tests, requires familiarity with the printed English language. Pupils from homes where a foreign language is spoken cannot be considered as properly tested by this test. This simply means that some allowance must be made for such a pupil's score being lower than otherwise on account of what is generally termed " language difficulty." How much allowance to make is not known.

Educational Ability. That which is measured by Part I we have called Achievement, but we may also call it Educational Ability as distinguished from Mental Ability.

Classification Score. Provision is made for combining the scores in Parts I and II to yield a total score which we shall call the Classification Score.

Mental-Educational Ability. The ability measured by the Classification Score we shall call combined Mental-Educational Ability.

Age norms.[1] By means of a careful study of the performance of pupils of the various ages, the normal or median score for each age has been determined as nearly as possible in Part I, Part II, and Total Score. These are given in Table 2 on the next page. Thus it will be seen by this table that the normal child of 12 years 0 months is expected to make a score of 45 in the Achievement Test, a score of 38 in the Mental Ability Test, and hence a total of 83 as his classification score. The same for the other ages from 8 to 18.[2]

Derivation of norms. The age norms for Part II, the Mental Ability Test, are those given in the Manual of Directions for the Otis Self-Administering Tests of Men-

[1] For grade norms see page 11.

[2] In cases such as that of age 8 years 5 months, the norm for the classification score is not equal to the sum of the norms for the two parts of the test. This is because two fractions, each less than a half, when added made more than a half.

TABLE 2

AGE NORMS IN ACHIEVEMENT TEST, MENTAL ABILITY TEST, AND CLASSIFICATION TEST (TOTAL SCORE)

		YEARS																											
		8			9			10			11			12			13			14			15			16			17			18 or over		
		ACH.	M.A.	CLASS.	ACH.	M.A.	CLASS.	ACH.	M.A.	CLASS.	ACH.	M.A.	CLASS.	ACH.	M.A.	CLASS.	ACH.	M.A.	CLASS.	ACH.	M.A.	CLASS.	ACH.	M.A.	CLASS.	ACH.	M.A.	CLASS.	ACH.	M.A.	CLASS.	ACH.	M.A.	CLASS.
MONTHS	0	6	8	13	16	15	31	26	23	49	36	31	67	45	38	83	53	44	97	59	49	108	63	53	116	67	56	123	70	58	128	71	59	130
	1	7	8	15	17	16	33	27	24	51	37	32	69	46	39	85	53	44	98	59	49	109	64	53	117	67	56	124	70	58	128			
	2	8	8	16	18	16	34	28	24	52	38	32	70	47	39	86	54	45	99	60	50	110	64	53	117	68	56	124	70	58	129			
	3	9	9	18	19	17	36	29	25	54	38	33	71	47	40	87	54	45	100	60	50	110	64	54	118	68	57	125	71	58	129			
	4	9	10	19	19	18	37	29	26	55	39	34	73	48	40	88	55	46	101	61	50	111	65	54	119	68	57	125	71	58	129			
	5	10	10	21	20	18	39	30	26	57	40	34	74	49	41	90	55	46	101	61	51	112	65	54	119	68	57	125	71	58	129			
	6	11	11	22	21	19	40	31	27	58	41	35	75	49	41	91	56	46	102	61	51	112	65	55	120	69	57	126	71	59	130			
	7	12	12	24	22	20	42	32	28	60	42	35	77	50	42	92	56	47	103	62	51	113	66	55	121	69	57	126	71	59	130			
	8	13	12	25	23	20	43	33	28	61	42	36	78	50	42	93	57	47	104	62	52	114	66	55	121	69	58	127	71	59	130			
	9	14	13	27	24	21	45	33	29	63	43	36	79	51	43	94	57	48	105	62	52	114	66	55	122	69	58	127	71	59	130			
	10	14	14	28	24	22	46	34	30	64	44	37	81	52	43	95	58	48	106	63	52	115	66	56	122	70	58	127	71	59	130			
	11	15	14	30	25	22	48	35	30	65	45	37	82	52	43	96	58	49	107	63	53	116	67	56	123	70	58	128	71	59	130			

tal Ability, Intermediate Examination. They were established according to the judgment of the author upon consideration of (1) the median scores of various age groups of about 1000 pupils, (2) comparison between the Intermediate Examination and the Advanced Examination for which norms were derived based upon 25,000 scores, (3) correlations between the Intermediate Examination and the Herring Revision of the Binet-Simon Tests and confirmed on the basis (4) of comparison between scores in the Mental Ability Test and average mental ages obtained by the National Intelligence Tests and Haggerty Intelligence Examination, Delta 2.

The age norms for Part I, the Achievement Test, were established upon consideration of (1) the median scores of various age groups of about 2000 pupils, (2) the relation between scores in the Achievement Test and the Mental Ability Test, and (3) the relation between scores in the Achievement Test and Average Educational Ages obtained from a battery of six achievement tests.[1]

Graphic representation of growth. In Figure 1 is shown graphically the growth of a hypothetical normal pupil in Mental Ability, Achievement, and combined Mental-Educational Ability. Thus the middle curve shows that at the age of 8 years the normal pupil will make a score of 6 in the Achievement Test, a score of 16 at the age of 9 years, etc., up to 18 years, when he will make a score of 71. The true position of the curve for ages above about 15 is uncertain, since no pupils have been tested above the 9th grade and it was impossible to determine what the median scores of unselected pupils of ages 15 to 18 would be. However, it is believed that the position of the curve is near enough to correct for practical purposes. This applies also, of course, to the norms for ages above 15 for Part I in Table 2 which correspond to the position of the curve.

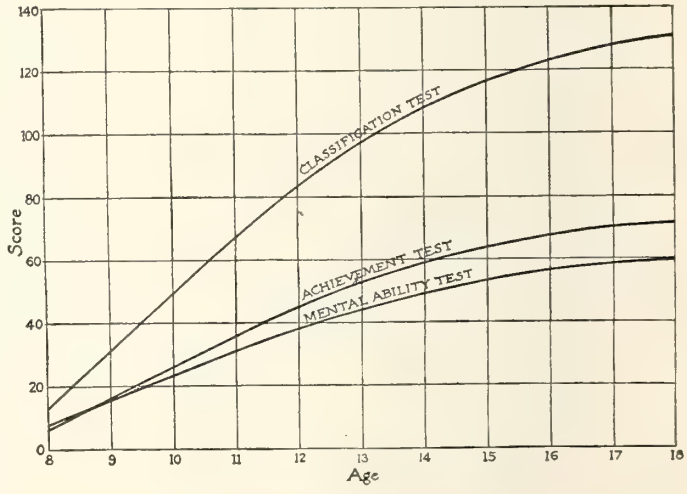


FIG. 1

Figure 1 shows also the growth of the normal pupil in mental ability as represented by his score in Part II. Thus the lower curve shows that the normal pupil will make in Part II a score of 7 points at 8 years, a score of 15 points at 9 years, etc., up to the age of 18, when he will make a score of 59 points.

Mental maturity. It is assumed that the normal pupil will never make a score of more than 59 points in Part II. It is believed that at 18 years, if not earlier, a pupil has attained his maximum innate mental development, his maximum learning ability, or thinking power; in other words, he has reached mental maturity.

The upper curve in Figure 1 also shows the growth of a

[1] Thorndike-McCall Reading Scale; Woody-McCall Mixed Fundamentals, Forms I and II; Kelley-Trabue Completion Exercise, Alpha; New York Standard Geography Tests, Series A, Tests 4, 5, and 8; Otis Arithmetic Reasoning Test, Form A; and the New York Spelling Scale, Forms C and D.

normal pupil in Mental-Educational Ability as measured by his Classification Score.

Mental Age (MA). The term " mental age " arose in connection with the Binet-Simon Tests. Originally it referred to the degree of mental ability that is normal for a given age. Thus " having a mental age of 13 years " meant " having a degree of mental ability just normal for the age of 13 years." This degree of mental ability is measured by a score of 44 in the Mental Ability Test. Having a mental age of 17 years, according to this definition, meant making a score just normal for 17-year-olds, which is a score of 58 in the Mental Ability Test. Mental ages so found may be called " true mental ages." There is no age for which a score above 59 in the Mental Ability Test is the norm; therefore, of course, no score above 59 can be expressed as a *true* mental age.

True mental ages can be found to represent all scores up to 59 by means of Table 2. To find the true mental age corresponding to a score, find the score in the table and note the age for which it is the norm.

Binet mental age equivalents. Scores in the Binet-Simon Tests are calculated directly in terms of mental ages that extend from 3 years to 19 years 6 months. These are true mental ages up to about 14 years. Beyond this mental age they are fictitious and do not represent the normal performance of individuals of the same chronological age.

For the convenience of those who wish to express scores in the Mental Ability Test in terms of mental age, we have given in Table 3 the approximate Binet mental age equivalents of scores in the Mental Ability Test.

Educational Age (EA). The custom has grown up of expressing the scores of achievement tests as " educational ages " analogous to Binet mental ages. Thus a pupil making a score in an achievement test just normal for 12-year-olds is said to have an educational age of 12 years. This ability is represented by a score of 45 in the Achievement Test.

True educational ages may be obtained from Table 2 in the same way that true mental ages are obtained; namely, by finding the achievement score in the table and noting the age for which it is the norm. Since the norms in the Achievement Test, however, do not extend above 71, no score above 71 can be expressed in this manner as a true educational age.

It is customary, however, to assign fictitious educational ages to scores above those normal for pupils of school age. For the convenience of those who wish to express all scores in the Achievement Test up to 115 in terms of some age, educational ages corresponding to all scores are given in Table 3.

Table 3 is read as follows: A score of 1 in the Achievement Test represents an educational age of 91 months, while a score of 1 in the Mental Ability Test represents a mental age of 88 months; a score of 41 in the Achievement Test represents an educational age of 138 months, while a score of 41 in the Mental Ability Test represents a mental age of 148 months; etc.

Brightness and dullness. Any pupil who makes a score in the Mental Ability Test above the norm for his age may be considered as brighter than normal, and any pupil who makes a score in that test below the norm for his age may be considered as duller than normal. The amount of his score above or below the norm for his age is a measure of the pupil's degree of brightness. (The term " brightness " is used to mean state of being bright or dull.) Thus a 10-year pupil making a score of 30 (norm for 10 years = 23) is brighter than a 12-year pupil making a score of 35 (norm for 12 years = 38), although the 12-year pupil has a higher level of mental ability.

Measures of brightness. Brightness is generally measured in terms of the Intelligence Quotient (IQ), which

TABLE 3

SHOWING THE EDUCATIONAL AGES CORRESPONDING TO SCORES IN THE ACHIEVEMENT TEST AND THE BINET MENTAL AGE EQUIVALENTS OF SCORES IN THE MENTAL ABILITY TEST

Score	EA	Score	EA	Score	EA	Score	MA	Score	MA
1	91	41	138	81	212	1	88	41	148
2	92	42	139	82	214	2	89	42	150
3	93	43	141	83	216	3	90	43	152
4	94	44	142	84	218	4	91	44	154
5	95	45	143	85	220	5	92	45	155
6	96	46	145	86	222	6	93	46	157
7	97	47	146	87	224	7	94	47	159
8	98	48	148	88	226	8	95	48	161
9	99	49	149	89	228	9	96	49	163
10	101	50	151	90	230	10	98	50	166
11	102	51	153	91	232	11	100	51	168
12	103	52	154	92	234	12	101	52	170
13	104	53	156	93	236	13	103	53	172
14	105	54	158	94	238	14	105	54	174
15	107	55	160	95	240	15	107	55	176
16	108	56	162	96	242	16	108	56	178
17	109	57	164	97	244	17	110	57	180
18	110	58	166	98	246	18	111	58	182
19	111	59	168	99	248	19	113	59	185
20	113	60	170	100	250	20	115	60	188
21	114	61	172	101	252	21	116	61	191
22	115	62	174	102	254	22	118	62	193
23	116	63	176	103	256	23	120	63	195
24	117	64	178	104	258	24	121	64	198
25	119	65	180	105	260	25	123	65	200
26	120	66	182	106	262	26	124	66	203
27	121	67	184	107	264	27	126	67	206
28	122	68	186	108	266	28	127	68	209
29	123	69	188	109	268	29	129	69	212
30	125	70	190	110	270	30	130	70	214
31	126	71	192	111	272	31	132	71	216
32	127	72	194	112	274	32	134	72	219
33	128	73	196	113	276	33	135	73	221
34	130	74	198	114	278	34	137	74	223
35	131	75	200	115	280	35	138	75	225
36	132	76	202	.	.	36	140	.	.
37	133	77	204	.	.	37	142	.	.
38	134	78	206	.	.	38	144	.	.
39	136	79	208	.	.	39	145	.	.
40	137	80	210	.	.	40	146	.	.

is customarily found by dividing the individual's Binet Mental Age by his chronological age (decimal point dropped). In the case of mental-ability tests other than the Binet Tests it is customary to give Binet Mental Age equivalents of scores in order that these may be used in finding IQ's. It has been found, however, that IQ's so derived have an appreciably wider range than those obtained by means of the Binet Tests and are therefore not comparable with the latter. Now the IQ was invented for use with the Binet Tests and should retain its original significance, or else it will become relatively meaningless. It seems that the term " Intelligence Quotient " is coming to have a legal recognition, but IQ's as sometimes derived from group tests of mental ability bear little relation to IQ's derived by the Binet Tests. It is the purpose of the author to use the term " IQ " only in its original significance.

Unless it is distinctly understood how IQ's were derived in any case, however, they should be designated by some means such as National IQ's, Otis IQ's, or Binet IQ's. The term " IQ," when not so qualified or understood, must be interpreted as referring to actual Intelligence Quotients found by means of the Binet Tests.

Derivation of IQ Scale. According to Dr. Terman,[1] IQ's found by the Stanford Revision of the Binet-Simon Tests are distributed very closely in accordance with the law of normal distribution and are such that the middle 50 per cent fall within the range of IQ's from 92 to 108.

Due partly, no doubt, to the form of the Mental Ability Test, — the steps in difficulty between items being smaller in the first part of the test than in the last part, — the distributions of scores of the several age groups have approximately the same variability, as far as can be determined. These distributions tend to be approximately normal, and are such that the middle 50 per cent of scores of each age group tend to fall within 8 points above and below the norm for that age. Fortunately, therefore, each point in the score of an individual above or below the norm for his age represents a point in IQ above or below 100. If an individual's score exceeds the norm for his age by 12 points, his IQ is 112.

How to find the IQ. To find the IQ of a pupil, find his age in Table 2 and note the corresponding norm. Find the number of points by which the pupil's score exceeds or falls below the norm for his age. Add to 100 the number of points by which his score exceeds the norm for his age, or subtract from 100 the number of points by which his score falls below the norm. Thus, if a pupil of 13 years 10 months makes a score of 53 in the Mental Ability Test, his score is 5 points above the norm for the age of 13 years 10 months (which is 48 according to Table 2). Therefore his IQ is 105.

When the score of a pupil is below the norm for his age, it is easier to use the following method of finding the IQ, which yields the same result as the method given above. Add 100 to the pupil's score and subtract the norm for his age. This method can be used whether the score is above or below the norm. If desired, the IQ of each pupil may be entered after his name on the Class Record, in one of the columns headed " Supplementary Data."

IQ's found by this method are not the same as if found by the usual method of dividing mental age equivalents by the chronological age, but are believed more nearly to approximate IQ's as obtained by the Binet-Simon Tests.

Educational Quotient (EQ). The educational age of a pupil may be above or below his chronological age, of course, in the same way that his mental age may be above or below his chronological age. It is customary, therefore, to find the ratio of a pupil's educational age to his chronological age and to call this his educational quotient (EQ). The educational quotient of a pupil is a measure, therefore, of his acceleration or retardation in school achievement. We might call it a measure of educational brightness analogous to the IQ as a measure of mental brightness.

How to find the EQ of a pupil. Since we have provided that the IQ of a pupil will be found by subtraction instead of division, we suggest that the measure of educational brightness be found in the same way. Thus, find the number of points by which a pupil's score in the Achievement Test exceeds the norm for his age as given in Table 2, and add this number to 100. The result may be called the " EQ " of the pupil and for all practical purposes will be comparable to an EQ derived in the usual manner. If the pupil's score is below the norm for his age, add 100 to his score and subtract the norm for his age as explained in regard to finding IQ's. If desired, the pupil's EQ may be entered in one of the columns headed " Supplementary Data," on the Class Record.

Comparison of EQ with IQ. If a pupil has a mental age of 12 years, he should be capable of doing the school work that is normal for a 12-year child, no matter what his actual age may be, provided his health is normal, etc. That is, if a pupil is doing as well in his school work as would be expected of a pupil of his degree of mental ability, his EA will be the same as his MA. Similarly, of course, his EQ will equal his IQ.

If a pupil's EA is greater than his MA, it would appear that he is doing or has done better work than would be expected of a pupil of his degree of mental ability. This may be the result of superior school training, either in the way of method or as the result of stimulation and encouragement on the part of the teacher, or of superior home training either before the pupil entered school or during his school career or both, or of special interest or perseverance on the part of the pupil, or a special desire to excel in school. It generally happens that a dull pupil who has been promoted beyond his mental ability on account of his age is compelled to work over his normal capacity to keep up with the class.

If a pupil's EA is less than his MA, it would appear that he is not doing or has not done as good school work as he should for his degree of mental ability. This may be the

[1] L. M. Terman, *The Measurement of Intelligence* (Houghton Mifflin Company, Boston), page 79.

result of poor school training — either poor methods or indifferent teaching; or of poor home training, such as the hearing of ungrammatical language at home; or of improper methods of study, indifference, lack of interest in school work, ill health, absence from school, laziness, lack of stimulating influences, etc.

The Accomplishment Ratio. The quotient obtained by dividing a pupil's educational age by his mental age is called his Accomplishment Ratio (AR). (This was previously called the Accomplishment Quotient.) To the extent to which a pupil's true accomplishment ratio is above 100, he is accomplishing or has accomplished more than the normal pupil of his age and degree of brightness; and to the extent to which a pupil's true accomplishment ratio is below 100, he is accomplishing or has accomplished less than the normal pupil of his age and degree of brightness, and the cause should be investigated.

The accomplishment ratio may be thought of as a measure of effort.

Unreliability of the Accomplishment Ratio. Recent investigations show that the true differences between pupils' educational and mental ages are relatively slight in most cases. We may infer this from the fact that the correlation between mental and educational ages is practically as high as that between two measures of mental age or two measures of educational age of the same pupils obtained by different group tests. For this reason the reader is cautioned not to put too much reliance on the accomplishment ratio of any particular pupil. Only high or low accomplishment ratios are significant, and these should be verified by the administration of the second form of the Classification Test or some other mental ability test and achievement test before being accepted as valid.

A measure of effort which has exactly the same significance for all practical purposes as the accomplishment ratio may be found from scores in the Classification Test in a much simpler way than the customary one, which is to convert a pupil's scores in an achievement test and mental ability test into educational and mental ages and divide the educational age by the mental age. The simpler method of measuring the effort of a pupil is to find the score in the Achievement Test that is normal for a pupil of his degree of mental ability and to compare this with the actual score he has made in the Achievement Test.

Thus, Table 4 gives the score in the Achievement Test that corresponds to each score in the Mental Ability Test. It will be seen, for example, that the Achievement score corresponding to a Mental Ability score of 40 is 47. A pupil making a Mental Ability score of 40, then, would be expected to make an Achievement score of 47. Let us suppose his Achievement score is 52. This is 5 points above what is expected of him. We may add these 5 points to 100 and say the pupil's measure of effort is 105. This measure will correspond so closely to the accomplishment ratio as usually calculated that it is suggested that this measure be used and called the accomplishment ratio (AR).

How to find the Accomplishment Ratio. To find the AR of a pupil, find in Table 4 the score in the Achievement Test (Part I) corresponding to the pupil's actual score in the Mental Ability Test (Part II). Call this his

TABLE 4

SHOWING THE EXPECTED ACHIEVEMENT SCORE CORRESPONDING TO EACH MENTAL ABILITY SCORE

MENT. ABIL. SCORE	EXP. ACH. SCORE	MENT. ABIL. SCORE	EXP. ACH. SCORE	MENT. ABIL. SCORE	EXP. ACH. SCORE	MENT. ABIL. SCORE	EXP. ACH. SCORE	MENT. ABIL. SCORE	EXP. ACH. SCORE
1	0	16	17	31	36	46	55	61	74
2	1	17	19	32	37	47	56	62	75
3	2	18	20	33	39	48	57	63	76
4	3	19	21	34	40	49	59	64	77
5	4	20	22	35	41	50	60	65	79
6	5	21	24	36	42	51	61	66	80
7	6	22	25	37	44	52	62	67	82
8	8	23	26	38	45	53	64	68	84
9	9	24	27	39	46	54	65	69	86
10	10	25	29	40	47	55	66	70	88
11	11	26	30	41	49	56	67	71	90
12	12	27	31	42	50	57	69	72	92
13	14	28	32	43	51	58	70	73	94
14	15	29	34	44	52	59	71	74	97
15	16	30	35	45	54	60	72	75	100

Expected Achievement Score (EAS). Add to 100 the number of points by which the pupil's actual Achievement score exceeds his expected Achievement score, or subtract from 100 the number of points by which his actual Achievement score falls below his expected Achievement score. The result is his accomplishment ratio or index of effort.

A simpler method when the pupil's actual Achievement score is less than his expected Achievement score is to add 100 points to his actual score and subtract his expected score. Thus if a pupil's actual score is 45 and his expected score is 53, his AR = 145 − 53 = 92.

An AR of 100 means just normal effort — the median effort put forth by school pupils in general. This may not be the effort of which they are capable, and it may be below the degree of effort they should put forth. Moreover, when methods of teaching have been improved as the result of the recent introduction of scientific method in measurement and diagnosis, pupils in general will achieve more in comparison with their degree of mental ability and an upward revision of Achievement Test norms will be necessary.

An AR of more than 100 means more than normal achievement for one's mental age, and an AR of less than 100 means less than normal achievement for one's mental age. Again let us caution the reader, however, against placing too great reliance on one unverified AR. There are too many influences that tend to cause AR's to be in error.

By a study of the AR's of about 1000 pupils we find that the middle half of AR's are between 95 and 105, and

that 90 per cent of them are between 90 and 110. AR's lying outside these limits may well be investigated.

If desired, the pupil's AR's may be entered in one of the columns headed " Supplementary Data " on the Class Record.

Classification Index (CI). We have already discussed the method of expressing the brightness (" mental brightness ") of a pupil in terms of the IQ and his " educational brightness " in terms of the EQ. We have provided for combining the measures of achievement and mental ability in a mental-educational age (MEA). We should have a similar measure of combined mental-educational brightness. The most convenient measure is undoubtedly the average of the pupil's IQ and EQ. This we might call his combined intelligence-educational quotient, but we prefer to call it his Classification Index (CI). This is probably the most important measure that is derived from the Classification Test.

The classification index of a pupil may be found, therefore, by averaging his IQ and EQ, found as described above. Provision is made, however, for finding this measure more conveniently by means of a chart called the Interpretation Chart.

Interpretation Chart. There is provided in each package of tests an interpretation chart similar to the chart shown in Figure 2, which will be found a distinct aid in interpreting scores. In Figure 2 are plotted points representing the scores of 326 pupils in Grades 4 to 8 of a large school in New York City. Each dot represents one pupil. The height of the dot represents the pupil's score as indicated by the scale at the left, except that each score that is an odd number has been plotted as the even number just below it [1] in order that all the dots would fall on lines. The horizontal position of the dot represents the pupil's age in years and months according to the scale at the bottom. The heavy curved line through the center of the chart is the same as the upper curve in Figure 1 and represents the growth of the normal individual in Mental-Educational Age as measured by the Classification Score. The point at which it cuts each vertical age line represents the score that is the norm for that age.

How to find the Classification Index (CI) by means of the Interpretation Chart. If a pupil's score as plotted in the Interpretation Chart (see Figure 2) falls on the heavy curve, the pupil is exactly normal and his CI is 100. If the dot falls on the next curve above the heavy one, his CI is 103. All pupils whose dots fall on the next curve have a CI of 106, etc.

To find the Classification Index of a pupil, therefore, plot his score in the Interpretation Chart by placing a dot on the vertical line representing the age of the pupil at a height representing his score, and determining his CI by noting the curve on or near which the dot falls. Thus a pupil aged 12 years 5 months, making a score of 96, has a CI of 103. If the dot falls between two curves, the CI is found by interpolation (estimation according to the relative position of the dot between the two curves). For example, a pupil of 12 years 0 months, making a score of 130, would have a CI of 123.

The Classification Index of each pupil should be found by one of the above methods and entered in the column headed " CI " in the Class Record.

Interpretation of a Scatter Diagram. A figure such as Figure 2, in which a number of points have been plotted, is called a " scatter diagram." The scatter diagram in Figure 2 shows at a glance a number of facts about the pupils whose scores are represented. The higher the dot in the chart, the higher the classification score. The farther to the right, the older the pupil. The higher the dot *with reference to the curves*, the brighter the pupil. The last statement will be made clearer below.

A dot in the upper right-hand corner represents the high score of an old pupil. Dots in the upper left-hand corner represent the scores of pupils who are young, yet mature mentally and educationally and who are therefore bright and accelerated.[1] Dots in the lower right-hand corner are of pupils who, though old, are very immature mentally and educationally and who are therefore dull and retarded.[1] Dots in the lower left-hand corner are of pupils who are both young and immature.

Pupils whose dots fall within a short distance of the heavy lines representing the growth of a hypothetical exactly normal individual may be considered as "normal" (not especially bright or dull or educationally accelerated or retarded).

Distribution of scores and of CI's. The distribution of scores of any groups whose scores are plotted on the Interpretation Chart may be found by adding the dots on each horizontal line and placing the sum in the box at the left. The 6 dots in Figure 2 on the line opposite 90 in the Score column represent scores of 90 and 91. The 8 dots on the next line above represent scores of 92 and 93, etc. These 14 dots and the 10, 7, and 6 on the next three lines add to 37, the number of scores from 90 to 99.

It is possible, of course, to represent a score of 91 by placing the dot in the space above the line representing a score of 90. If this method is used, count together the dots on each line and in the space above it.

The distribution of CI's may be found in the columns at the top and right of the chart by adding the dots between the curves. In Figure 2 there are 19 dots between curve 100 and curve 103 (counting those touching the lower curve but not the upper). These 19 CI's are considered as being in the interval 100 to 102. There are 24 in the interval 103 to 105, etc.

It will be seen that the majority of pupils whose scores are shown in Figure 2 have CI's above 100. This is due partly, no doubt, to the fact that these pupils were " test wise "; that is, they had had a good many tests before. Moreover, it is likely that as a group they were somewhat brighter than normal.

[1] Below rather than above so that intervals of score could extend from 0 to 9, 10 to 19, etc., as is customary.

[1] The terms "accelerated" and "retarded" as used here refer, not to grade location, but to true educational status in comparison with age.

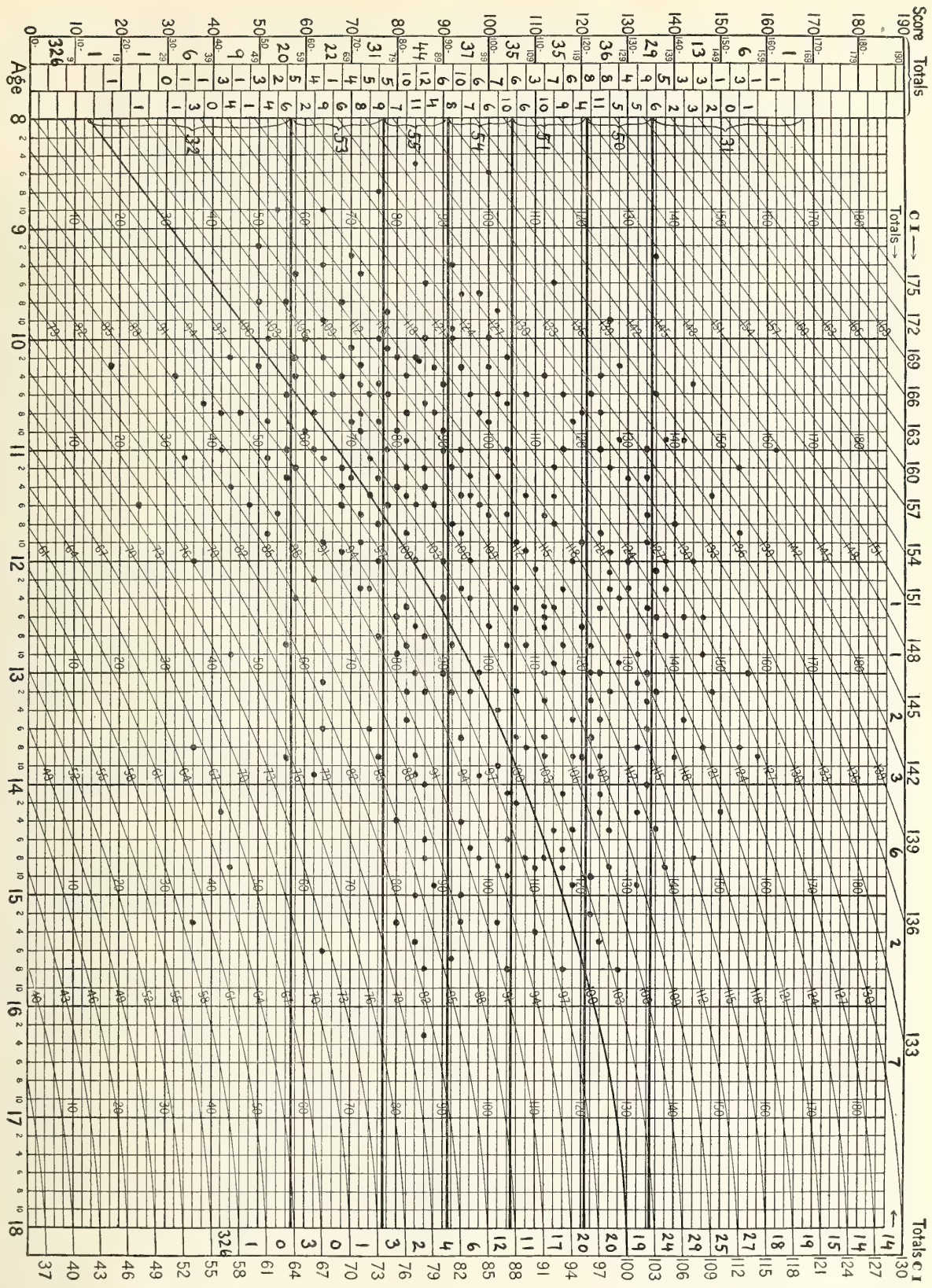


FIG. 2. Illustrating the use of the Interpretation Chart in the regrading of 326 pupils in Grades 4 to 8 of a large school.

VI. STANDARDIZATION

Selection of items. The selection of items for the Mental Ability Test (Intermediate Examination) is described fully in the Manual of Directions for the Otis Self-Administering Tests of Mental Ability. The items in the Mental Ability Test represent a selection from a large number of items, made after a careful research to investigate the diagnostic value of each individual item. Only those items were selected that distinguished best

between pupils who progressed slowly and those who progressed rapidly in school.

A different criterion was used in the case of items for the Achievement Test. From a large number of items used in preliminary editions, only those items were selected that showed a distinct rise, from grade to grade, in number of pupils passing, indicating that ability to pass the items depended on school knowledge.

Arrangement in order of difficulty. The relative difficulty of the various items has been found according to the number of passes of each item by the pupils taking the preliminary edition. The items in Part II are arranged in order of difficulty. Those in Part I are arranged in the order of difficulty in each subject. (See page 12.)

Equality of forms. All forms of the Classification Test are of equal difficulty. The tables of norms and directions for interpreting scores therefore apply to scores of any form. Any form may be given first, although it is customary to give Form A first. However, when pupils must sit very close together in an examination, it is desirable to give every other pupil in each row an alternative form.

Practice effect. Whenever a second form of a test is given after a first form, especially when the two forms have been made very much alike, students tend to do better on the second test. The effect of the first test is generally termed " practice effect," but it may include a number of effects. Among these are general familiarity with the method, resulting in ability to get under way more quickly, lessened nervousness, memory of mode of attack of certain types of problems, etc.

A study was made of the effect of practice when a second form of the Classification Test was given two days after the first form. The average gain was about 3 points in both Parts I and II, making 6 points in Total Score. Therefore, in such a case 3 points should be subtracted from the score in each part of the second test in order to compare these scores with the norms which apply to first tests only. Six points should be subtracted from the total score in the second test before comparing with scores in the first test or with norms.

It will be seen that when both forms are given the average of the total scores in the two forms will tend to be only 3 points higher than the score in the first test; therefore 3 points only need be subtracted from the average of the total scores in both forms in order to compare with norms.

It is undoubtedly true that pupils who have had previous experience in taking standard tests will be more at ease with this test and consequently do better than if it were something quite new to them. This fact should be borne in mind when comparing scores with norms. The norms are based on the scores of pupils who have had a moderate acquaintance with standard tests. We should expect, therefore, that pupils wholly unfamiliar with standard tests would not do so well as the norms would indicate they should.

It remains for further investigation to reveal the effect of practice after other amounts of time than two days. Presumably, however, practice effect may be a little greater with a shorter time between tests and diminishes gradually with increases of intervals between tests.

VII. SCHOOL REORGANIZATION

Two types of reorganization. There are two distinct types of reorganization that may be put into effect by means of the Otis Classification Test. One of these is regrading for the purpose of placing in each grade pupils who are approximately homogeneous with reference to mental ability and achievement. The other is a division of grades into classes containing pupils that are of approximately the same degree of brightness, as, for example, the division of a grade into three classes: bright, normal, and dull.

Both these types of reorganization are often spoken of as " reclassifying,"and the distinction must be kept clear or confusion of thought will arise. The first type we shall call regrading and the second reclassifying. Regrading is done on the basis of score — in this case the classification score. Reclassifying is done on the basis of a measure of brightness — in this case the Classification Index.

Regrading. The range of scores of pupils in each single grade of almost any school that has not been regraded on the basis of tests is so great that regrading is difficult and to attempt at one time to eliminate all overlapping of ability between grades would mean a complete upheaval of the school. For that reason it is recommended that progress toward the ideal grading be made gradually.

As an illustration, let us consider the pupils whose scores are plotted in Figure 2. The dots represent the scores of 326 pupils in Grades 4 to 8 tested at the beginning of the school year. It is safe to assume that at least 10 per cent of these could do entirely satisfactory 9th-grade work. By counting the number of dots on each line beginning at the top, it was found that the upper 31 (approximately 10 per cent) made scores of 136 or over. We have therefore drawn a horizontal line across the chart, marking off these upper 31 scores.

Similarly, the pupils making the lower 10 per cent of scores will undoubtedly be unable, either for lack of mental ability or preparation or both, to do satisfactory 4th-grade work and should remain in the 3d grade. We have therefore counted the dots on each line beginning at the bottom and drawn a horizontal line marking off the lower 32 dots (10 per cent) which are below 58.

There are 263 dots left between these upper and lower horizontal lines, representing pupils who belong in Grades 4 to 8. Dividing this number by 5 gives 53 pupils as the approximate number to be placed in each grade. Horizontal lines have been drawn dividing the dots so that approximately 53 pupils should fall in each grade.

The determination of the theoretical ranges of scores for each grade may be done somewhat more conveniently and

accurately by means of the percentile graph. The method is explained after the description of the percentile graph. (See Figure 3, page 13.)

It will be seen that if this method of regrading is followed, the most advanced pupils, mentally and educationally, are moved on into the high school; the most immature pupils, mentally and educationally, are left in the 3d grade; and the remaining pupils are divided among Grades 4 to 8 in such a way that about the same number fall in each grade. Moreover, there is no overlapping of ability between grades — the pupils of each grade are as homogeneous in mental-educational ability as possible.

Now, as has been said, it is not practical to make this complete reorganization at one time because this might result in some pupils being promoted or demoted two or three or possibly four years. The practical plan is to plot the scores of the pupils and divide them as explained above, just as if the complete reorganization were to be made, and then find the intervals of score for the various grades on the theoretical basis. Thus, as shown in Figure 2, these would be as follows: Third grade 27 or less, Fourth grade 58 to 77, Fifth grade 78 to 91, Sixth grade 92 to 105, Seventh grade 106 to 121, Eighth grade 122 to 135, Ninth grade 136 or over. Having made this table of theoretical regrading, go back to the Class Record and write in the first column under the heading "Classification," opposite each pupil's name, the grade in which he belongs theoretically. You are then ready to make a practical regrading. Note the pupils who are not in their proper grades theoretically, and in consultation with the teacher determine in which cases the pupils' school work is fairly in accord with the test results. Move each of these pupils one grade up or down as the case may be. This will result in the proper placement of a considerable number of pupils, and the remaining ones who are still out of place theoretically may be shifted again at the end of the term or year if this seems necessary.

Some schools will feel it undesirable to do more than a very little, if any, demoting. In such cases, of course, progress toward the ideal grading will be slower and for a time the average age of the pupils of each grade will be reduced and grade standards of achievement will be less. Eventually, however, these may be brought up to normal.

It will be noted that no account has been taken of grade norms. This is because the problem of regrading any school is peculiar to that school. If the attempt is made to grade according to grade norms, one school might find itself with 30 or 40 per cent of its pupils requiring promotion or demotion two or more grades. Conditions must be taken as they are found and the regrading done accordingly. That is why we recommend first plotting the scores of the pupils to see just what the conditions are, and then making a theoretical regrading that is reasonably near the actual grading to serve as a guide in practical regrading.

It will be noted also that we have recommended consultation with the teachers regarding all pupils who are promoted or demoted, and only those pupils need be shifted in whose cases the teacher's judgment is in accord with the test verdict. In no case should the test result be the sole basis of shifting a pupil.

In making the actual assignments of pupils to grades, it is wise to take age into account. Other things being equal, the older pupil should be promoted first.

Grade status values. For the benefit of those who wish to compare their pupils in mental, educational, or combined mental-educational ability with those of schools in general, the accompanying table of grade status values is given.

This table is read as follows: A score of 8 in Part I corresponds to a grade status in achievement of 3.0, which means the status of the normal pupil at the beginning of the first month of the third grade. A score of 8 in Part II corresponds to a grade status of 3.3 in mental ability, which is the status of the normal pupil at the end of the third month of the third grade. A pupil making a total score of 15 has a grade status of 3.1, when mental ability and achievement are considered together. The grade status corresponding to the total score may be considered as virtually the same as the average grade status in mental ability and in achievement if figured separately.

TABLE 5

Part I	Part II	Total	Grade Status	Part I	Part II	Total	Grade Status
8	5	13	2.6	45	37	82	6.3
9	6	15	2.7	46	38	84	6.4
10	7	17	2.8	47	39	86	6.5
11	8	19	2.9	48	39	87	6.6
12	10	22	3.0	48	40	88	6.7
13	11	24	3.1	49	41	90	6.8
14	12	26	3.2	50	41	91	6.9
15	13	28	3.3	51	42	93	7.0
17	14	31	3.4	51	43	94	7.1
18	15	33	3.5	52	43	95	7.2
19	16	35	3.6	53	44	97	7.4
20	17	37	3.7	54	45	99	7.6
21	18	39	3.8	55	45	100	7.7
22	19	41	3.9	55	46	101	7.9
23	20	43	4.1	56	47	103	8.1
24	21	45	4.2	57	47	104	8.2
25	22	47	4.3	58	48	106	8.3
26	23	49	4.4	58	49	107	8.4
27	24	51	4.5	59	49	108	8.5
28	25	53	4.6	59	50	109	8.6
29	26	55	4.7	60	50	110	8.8
30	27	57	4.8	61	50	111	8.9
31	28	59	4.9	61	51	112	9.1
32	29	61	5.0	62	51	113	9.2
33	29	62	5.1	62	52	114	9.3
34	30	64	5.2	63	52	115	9.4
35	31	66	5.3	64	52	116	9.6
37	32	69	5.4	64	53	117	9.8
38	33	71	5.6	65	53	118	9.9
39	33	72	5.7	65	54	119	10.0
40	34	74	5.8	65	54	119	10.1
41	35	76	5.9	66	54	120	10.2
42	35	77	6.0	66	55	121	10.3
43	36	79	6.1	66	55	121	10.4
44	37	81	6.2	67	55	122	10.5

Reclassifying. So far we have not taken into account any consideration of the brightness or the chronological age of the pupils, nor have we discussed grading by half years. It will be seen, for example, that according to our theoretical regrading plan, shown in Figure 2, there would be 50 pupils in Grade 8 ranging in age all the way from 9 years 10 months to 15 years 8 months. This is too wide a range of ages to be included in a single grade ideally. The pupils who are taught together in the same room should be near enough the same age, if possible, so that they are socially congenial. This also makes the very young and very old or very large pupils less conspicuous.

It is recommended, therefore, that rather than regrade on the basis of half years, the pupils of each whole grade be divided into as many classes as feasible on the basis of brightness as measured by the Classification Index. This would amount practically to sectioning according to chronological age if the grading were done according to the ideal plan, in which the scores of the pupils constituting any one grade are very nearly equal, since of pupils making the same score, the younger the pupil the brighter he is, and the older the pupil the duller he is. However, inasmuch as it is not generally possible to regrade pupils so as to bring the range of scores of pupils of any one grade between narrow limits, it is better to classify on the basis of the Classification Index.

Thus let us suppose we wish to divide the 50 pupils of Grade 8 into two sections. This would best be done by finding the median CI for the grade and placing in a bright section all whose CI's were above the median and in a dull section all whose CI's were below the median.

If desired to form three classes, place in the bright section the third of the pupils who have the highest CI's; place in the normal section the third making the next highest CI's; and place the remaining third, making the lowest CI's, in the dull section.

Similarly a grade may be divided into any number of sections. Some principals prefer to let the brighter section contain more pupils than the duller section, for the reason that bright pupils are easier to teach and that this plan "equalizes the teaching load."

The multiple-track plan. Some schools arrange for these bright sections to remain intact from year to year, as far as possible, and to progress more or less independently of the other sections, sometimes doing the work of the eight grades in seven years or even six.

Similarly the dull pupils keep together and progress at their own rate, covering the work of the eight grades in nine or ten years. In this case the bright pupils are thought of as progressing on one track, the normal pupils on another, and the dull ones on another, and the arrangement is called the "multiple-track plan." There may be as many tracks, of course, as there are sections of a grade.

Differentiation of curriculum. There are various ways of differentiating the instruction of bright, normal, and dull sections. As has been said, in some schools these sections progress at different rates; in other schools, however, the bright and dull sections progress at the same rate as the normal section, but the dull section covers only the minimum essentials of the curriculum, while the bright section takes intensive work, consisting of heavier assignments, wider supplementary reading, additional subjects such as music, art, dramatics, etc.

There are, of course, various possible combinations of these two methods. Different schools are experimenting in different ways and no plan has received the general approval of all schools.

Analysis. The Otis Classification Test is not designed to measure ability in school subjects separately. However, if it is desired to analyze the achievement of a class in the several subjects, this may be done by reference to Table 6, which shows the subject classification of the items in the test.

TABLE 6

SHOWING THE ARRANGEMENT OF ITEMS IN EACH SUBJECT IN THE ACHIEVEMENT TEST, EITHER FORM

SUBJECT	FIRST CYCLE	SECOND CYCLE	THIRD CYCLE	TOTAL
1. Spelling	1 2 3 4 5	56 57 58	92 93	10
2. Grammar and Dictation	6 7 8 9 10	59 60 61 62	94 95 96	12
3. Arithmetic Reasoning	11 12 13 14 15	63 64 65	97 98	10
4. Geography	16 17 18 19 20 21	66 67 68 69 70	99 100 101	14
5. History and Civics	22 23 24 25 26 27	71 72 73 74	102 103 104	13
6. Physiology and Hygiene	28 29 30 31	75 76	105	7
7. Literature	32 33	77	106	4
8. Vocabulary	34 35 36	78 79	107	6
9. General Information, including Art	37 38 39 40 41 42 43	80 81 82 83 84	108 109 110 111	16
10. Music	44 45 46	85	112	5
11. Arithmetic Fundamentals	47 48 49 50 51 52 53 54 55	86 87 88 89 90 91	113 114 115	18

VIII. THE PERCENTILE GRAPH

In order to compare the score of any pupil with the scores of the class as a whole or to compare two or more classes, the most effective way is to draw a percentile curve for each grade or class. A sample percentile curve is shown on page 13 (Fig. 3). Such a curve may be drawn conveniently on a chart called the *Universal Percentile Graph*, published by World Book Company. Each package of charts contains complete directions for drawing a percentile curve.

Percentile rank in class. If an individual makes a score exceeding 25 per cent of the scores of his class, he is said to have a percentile rank of 25 in his class; and the same for other percentages. The percentile rank of any individual among the members of his class may be found from the percentile curve representing the scores of his class as follows: Find the point on the vertical scale in the Percentile Graph corresponding to his score and move the pencil horizontally to the point at the same height on the percentile curve for his class. Read the percentile rank on the horizontal scale immediately

below this point on the curve. This is the percentile rank of the individual among the members of his class. If his percentile rank is 80, it means that his score exceeds the scores of 80 per cent of his class.

The meaning of "percentile rank in class" must be distinguished from that of "Percentile Rank." When this expression is used unqualifiedly, it refers to brightness or the rank of an individual in mental ability among a large unselected group of his own age.

Use of the Percentile Graph in regrading. Figure 3 shows how the Percentile Graph might be used to find the grades in which the pupils belonged theoretically, whose scores were plotted in Figure 2. For this purpose it is not necessary to count the number of dots on each line, but merely to count the number of dots in each interval of 10 points of score. (Or, if desired, the papers may be sorted in order of score before plotting and the number falling in each interval can be counted very easily.)

If, as before, the upper 10 per cent of pupils are to be considered as properly belonging in the 9th grade, the lower 10 per cent as properly belonging in the 3d grade, and the remaining 80 per cent to be divided equally among Grades 4 to 8, the procedure would be as illustrated in Figure 3. The 90 percentile score would divide off those for the 9th grade, the 10 percentile would divide off those for the 3d grade, and the 26, 42, 58, and 74 percentile scores would divide the remaining 80 per cent into equal parts. The division scores obtained in this way are somewhat different from those obtained in the first way, but may be considered as more precise. When the distribution of scores has once been found and the percentile curve drawn, the finding of the grade ranges by means of the percentile curve is very easy.

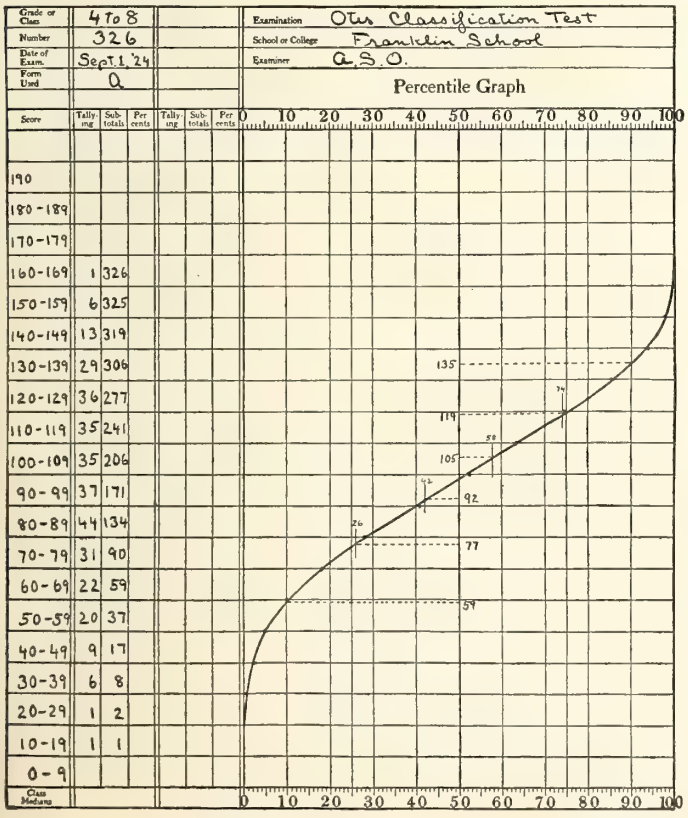


FIG. 3

IX. RELIABILITY AND VALIDITY

Reliability. By "reliability" is meant the degree to which the scores of a test are consistent in measuring whatever the test measures. Reliability is determined by means of correlation between two forms of a test. It may be expressed either in terms of the coefficient of such self-correlation, called a "reliability coefficient of correlation," or in terms of the probable error of a score, by which is meant the median value of the errors of measurement. An error of measurement is the difference between any actual score and the hypothetical true score of that individual.

For 289 cases in Grades 4 to 8 the reliability coefficients of correlation for Parts I and II were respectively .929 and .931. The probable error of a score by either part is a little less than 3 points.

The probable error of an EQ by the Achievement Test or of an IQ by the Mental Ability Test is, therefore, about 3 points.

The reliability coefficient for the Classification Test as a whole obtained from data of the 289 cases in Grades 4 to 8 is .953, with a probable error of 5.02 points and a probable error of Classification Index, therefore, of only $2\frac{1}{2}$ points.

Validity. There is no direct way of finding the validity of the test — the degree to which it measures the hypothetical quality we call mental ability or the general achievement of the pupil in school subjects. The method of standardization of this test as described on pages 9–10 is perhaps the best assurance as to its validity. Various other indications are available, however.

The correlation between average scores in the Achievement Test and average educational ages obtained from a battery of six achievement tests[1] in the case of 286 pupils in Grades 4 to 8 was .907. This coefficient is attenuated, of course, by the unreliability of all the tests. When corrected for attenuation the coefficient is .965, which shows that the Achievement Test measures almost identically the same ability that the battery of six achievement tests measures.

A comparison was made between the Mental Ability Test and the National Intelligence Tests and Haggerty Intelligence Examination: Delta 2, from the scores of 286 pupils in Grades 4 to 8. The correlation between the National Intelligence Tests and the Mental Ability Test was .889, the correlation between the National Intelligence Tests and Delta 2 was .926, and the correlation between the Mental Ability Test and Delta 2 was .927. The amount and approximate equality of these correlations suggest that the three tests measure approximately the same ability with approximately the same degree of validity.

[1] See footnote, page 4.

Partial correlation. The coefficients of partial correlation were found between average educational age by the battery of six achievement tests and grade with age constant, and between average scores in the Achievement Test and grade with age constant. These are virtually correlations between EQ and rate of progress through school. The partial coefficients were respectively .684 and .720, showing that the Achievement Test apparently furnishes a slightly better prognosis of progress through school than the battery of six achievement tests, which required several times as long to administer and score.

Similar partial correlations made between average MA (by the National Intelligence Tests and Delta 2) and grade with age constant, and between average scores in the Mental Ability Test and grade with age constant, were respectively .680 and .630. These coefficients show virtually the correlation between IQ and rate of progress through school and indicate that IQ's by the Achievement Test compare favorably in prognostic value with IQ's obtained by the National Intelligence Tests and Delta 2 together.

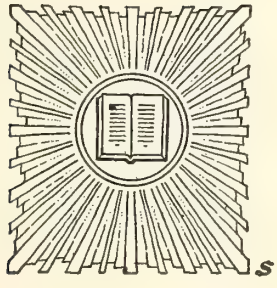
The correlation was calculated between Average Achievement score and teachers' scholarship marks for each grade separately in the 6th, 7th, and 8th grades. The coefficients ranged from .58 to .86, with a median value of .72. The teachers' marks showed a reliability coefficient of correlation of only .55. (Two marks of each pupil were correlated.) These coefficients show that the test scores correlate about as highly with the teachers' marks as these do with each other. Correcting the first coefficient for attenuation, the correlation between Achievement scores and scholarship as judged by the teacher is .94, which means that if the teachers were infallible in estimating scholarship, the test scores would correlate very highly with the teachers' judgments.

TERMAN GROUP TEST
OF
MENTAL ABILITY

FOR GRADES 7 TO 12

Prepared by Lewis M. Terman
Stanford University, California

MANUAL OF DIRECTIONS



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MANUAL OF DIRECTIONS

SPECIAL FEATURES OF THIS TEST

This test embodies many of the general features of other well-known scales for group testing. It differs from others in the following respects:

1. It is designed primarily for use in Grades 7 to 12, although it may be used also in Grade 6 and with first-year college students. Such restriction of the scope makes possible simplification of procedure, reduces the time required for securing a measure, and favors accuracy.

2. The test as it stands is composed of questions and problems which were selected from a much larger number by correlating each separate item with a dependable measure of mental ability. The criterion used for this purpose was a composite which included grade location, age, total score on a two-hour mental test, and ratings of the pupils by from two to five teachers on intelligence and quality of school work. The trial series was composed of thirteen tests with a total of 886 items. Try-out of these resulted in the elimination of three of the thirteen tests, and in the reduction of the 610 items in the remaining tests to 370. All items which failed to differentiate pupils of known brightness from pupils of known dullness were eliminated. Since only the cream of the original material was retained, it has been possible to reduce the length of the examination considerably below the limits which otherwise would have been necessary.

3. The time allowances for the separate tests are more than ordinarily liberal, considering the reduced number of items. Power, rather than speed, determines the pupil's score. Yet, because of economy of time in the procedure, the examination easily falls within a school period of thirty-five minutes.

4. Special attention has been given to simplicity and convenience. The directions can be mastered by any teacher in a few minutes. The personal equation of the examiner is reduced to a minimum. Each test is given two, three, or four minutes, half minutes being avoided. The typographical arrangement of the tests favors ready interpretation and promotes ease of scoring. The pupil does no writing. The size of the examination booklet makes it possible to test pupils in an auditorium or other room not equipped with desks. The scoring keys are especially convenient to use. On the back of each key are all the rules for scoring the test to which the key corresponds. A Manual of Directions and a set of scoring keys are included

in each test package, doing away with the necessity of ordering these separately.

The test is issued in two forms, Form A and Form B. Each contains 185 questions or problems. In ordering, it is only necessary to indicate the number of tests desired, and the form. When pupils are given two or more tests within a year, it is recommended that the two forms be used alternately.

In any test of intelligence there is always a margin of error. To reduce this to a minimum and thus to secure the most dependable possible basis for the grading and guidance of individual pupils, it is often advisable to give both forms and take the average of the two examinations as the pupil's score. When this plan is followed, the two forms should always be given on different days.

GENERAL DIRECTIONS

Pupils may be tested in classrooms or in large groups in an auditorium. If desks are not available, ordinary chairs may be used, in which case each pupil may be provided with a book as a rest for the paper.

Before beginning the test see that each pupil is provided with a pencil. Do not allow pens. Have at hand a few extra pencils for emergencies which may occur during the examination. Avoid saying anything which would call undue attention to the special nature of the examination or cause pupils to feel that they were facing an ordeal. Do not refer to the examination as a "brain test"; it is even unnecessary to use the word "intelligence." The examination should impress the pupil as just an ordinary event.

Require strict obedience and attention. Questions should not be permitted. If the room is large, it is well to have one or more assistants present to discourage any attempt to copy from a neighbor, to see that no one continues to work after the word "Stop," and to assist the occasional pupil who loses his place in turning from one test to another.

Cultivate an agreeable manner in giving the test. Both undue sternness and undue levity are to be avoided. The voice should be just loud enough to carry to all parts of the room. Avoid shouting.

Follow directions verbatim. No supplementary explanations or remarks of any kind are permissible.

Adhere rigidly to the time limits. A stop watch is desirable. In using an ordinary watch, count the revolutions of the second hand very carefully.

In turning to a new test, see that each pupil holds the backs of the examination booklet together, so that only a single test will be exposed to view. Avoid waste of time in transition from test to test.

THE TEST PROCEDURE

(To be followed verbatim)

" Here is a test to see what pupils can do. I will give each of you a test book. Do not open it until I tell you to." (Examiner sees that this is obeyed.)

After all are provided with blanks and pencils: **" Now fill the blanks in the first seven lines at the top of the first page. Do it as quickly as you can, but write plainly."** (Time for filling blanks should ordinarily not exceed 2 or 3 minutes.)

After blanks have been filled: **" Attention. Listen carefully to what you are told to do. Ask no questions. Do not look at your neighbor to see what he does. Do not begin till I say ' Go.' When I say ' Stop,' you must stop instantly and hold your pencils up. Both speed and accuracy will count toward your score. Try each question, but do not spend too much time on one you do not understand.**

" Now turn over the page to Test 1, and fold your books back, this way." (Examiner illustrates, holding his book up and folding the backs together.)

Test 1. Information

" Read the directions at the top of the page: ' Draw a line under the ONE word that makes the sentence true, as shown in the sample.' Ready — GO ! "

After *2 minutes*, say **" STOP ! Turn over the book to Test 2."**

Test 2. Best Answer

" Read the directions at the top of the page: ' Read each question or statement and make a cross before the BEST answer, as shown in the sample.' Ready — GO ! "

After *2 minutes*, say **" STOP ! Turn over the page to Test 3. Fold your books back."**

Test 3. Word Meaning

" Read the directions at the top of the page: ' When two words mean the SAME, draw a line under " SAME." When they mean the OPPOSITE, draw a line under " OPPOSITE."' Ready — GO ! "

After *2 minutes*, say **" STOP ! Turn over the book to Test 4."**

Test 4. Logical Selection

"Read the directions at the top of the page. 'In each sentence draw a line under the TWO words that tell what the thing ALWAYS has. Underline TWO, and ONLY TWO, in each line.' Ready — GO!"

After *3 minutes*, say "STOP! Turn over the page to Test 5. Fold your books back."

Test 5. Arithmetic

"Read the directions at the top of the page: 'Find the answers as quickly as you can. Write the answers on the dotted lines. Use the bottom of the page to figure on.' Ready — GO!"

After *4 minutes*, say "STOP! Turn over the book to Test 6."

Test 6. Sentence Meaning

"Read the directions at the top of the page: 'Draw a line under the right answer, as shown in the samples.' Ready — GO!"

After *2 minutes*, say "STOP! Turn over the page to Test 7. Fold your books back."

Test 7. Analogies

"Read the first sample at the top of the page: 'EAR is to HEAR as EYE is to' — what?" (Wait for correct response.)

"Yes. Read the second sample: 'HAT is to HEAD as SHOE is to' — what?" (Wait for correct response.)

"Do them all like the samples. Ready — GO!"

After *2 minutes*, say "STOP! Turn over the book to Test 8."

Test 8. Mixed Sentences

"Read the directions at the top of the page: 'The words in each sentence below are mixed up. If what a sentence means is TRUE, draw a line under "TRUE." If what it means is FALSE, draw a line under "FALSE."' Ready — GO!"

After *3 minutes*, say "STOP! Turn over the page to Test 9. Fold your books back."

Test 9. Classification

"Read the first sample at the top of the page: 'bullet, cannon, gun, sword, pencil.' These are all names of things to fight with except 'pencil,' so 'pencil' is crossed out.

"Read the second sample: 'Canada, Chicago, China, India, France.' These are all names of countries except 'Chicago,' so 'Chicago' is crossed out.

"In each line cross out the word that does not belong there. Cross out JUST ONE WORD in each line. Ready — GO!"

After *3 minutes*, say "STOP! Turn over the book to Test 10."

Test 10. Number Series

" Read the first sample at the top of the page : ' 5, 10, 15, 20, 25,' — the next two numbers would of course be 30, 35.

" Now read the second sample : ' 20, 18, 16, 14, 12,' — the next numbers would of course be 10, 8.

" In each row try to find out how the numbers are made up, then on the two dotted lines write the two numbers that should come next. Ready — GO ! "

After ***4 minutes***, say **" STOP ! Close your books."** (Examiner collects books immediately.)

SCORING

The scoring may be done either by the teachers or by clerical help. It should not be done by the pupils.

The ten scoring keys, which for convenience in handling are printed on a single sheet, should be cut apart as indicated by the vertical lines. To score a test lay the corresponding key on the left side of the page to be scored, taking care to match the numbers of key and test, and check each response as + or −. Where the score is "number right," time can be saved by merely checking correct responses.

Absolute accuracy in scoring should be the aim. The rules printed on the backs of the scoring keys should be consulted until they are thoroughly learned. Special care is necessary in scoring tests for which the score is "number right minus number wrong." Errors should be guarded against in transferring the scores of the ten tests to the first page.

Every addition to secure total score should be performed twice, preferably by different persons. This rule holds even when an adding machine is used.

USE OF RESULTS

School children of a given age or school grade differ enormously in intellectual ability. In a single grade differences of four or five years in mental age are frequent. In an average well-graded school the difficulty of the work fits only about the middle fifty or sixty per cent of the pupils. For the others the assigned tasks are either too easy or too hard. The most serious mistake of teachers is the failure to promote bright children as rapidly as their mental ability would warrant. Mental ability should, indeed, be the fundamental basis for all grading, classification, and promotion. A mental test for every pupil every year ought to become the rule.

Such tests are not merely valuable in helping to decide whether individual pupils ought to be promoted. They will probably find their most important function in the classification of pupils into different groups for special types of instruction. The Oakland plan of grouping the bright, the average, and the slow for separate instruction according to their needs offers, perhaps, the most practical solution of the problem. At present ten per cent of the cost of tuition in most public schools is for repeated instruction. This involves systematic training of children in habits of failure. Each pupil ought to be allowed to progress continuously and at a speed which is normal for *him*. The "three-track" system, or some other method of adjusting the work to the capacity of the pupils, is inevitable.

The use of the tests will clear up many misunderstandings regarding individual children. A given pupil who is doing only fair school work may be shown by the test either to have only fair ability or to be exceptionally superior. Another who is failing may have anything from very inferior to very superior intelligence. In no case is appropriate action possible without knowledge of the facts.

The seventh grade usually marks the real beginning of differentiated courses and prevocational education. From this point on, educational guidance becomes increasingly important. When educational guidance is properly carried out, the problems of vocational guidance are greatly simplified. For both, mental ability tests are indispensable.

However, instead of depending upon a test score as infallible, the teacher should make it the point of departure for further study of the pupil. Careful estimates should be made of the quality of school work; data on health, interests, habits, and social status should be gathered, and the mental tests may be supplemented by educational tests. Immediate wholesale regrading is not usually advisable. The judicious use of mental tests in a school system nearly always brings, as a matter of natural evolution, fundamental changes in curriculum, methods, classification of pupils, and vocational guidance. *The purpose of such tests is to make a difference in the educational treatment of the pupils, not to gratify a merely idle curiosity regarding their intellectual status.*

GRADE NORMS

Table 1 gives for each grade the scores which were equaled or exceeded by 1 per cent, $2\frac{1}{2}$ per cent, etc., of pupils of each grade. The median or 50-percentile score of each grade is the *norm* for that grade. These norms were revised in October, 1922, and are based on over 40,000 scores. About two thirds of these were from California and the remainder were chiefly from the Middle West. Norms for the country as a whole would probably be slightly lower, and doubtless much lower for the states which have relatively poor schools or a large proportion of relatively inferior population groups. The scores of Negro, Indian, and Mexican children will usually be found far below those of white children of the same grade or age. Considerable differences are found also between schools in good and poor sections of the same city. City schools usually make a better showing than rural or village schools, and in this connection it should be noted that our norms are chiefly from city schools.

TABLE 1. PERCENTILE SCORES BY GRADE

	GRADE	7	8	9	10	11	12
	1 per cent equal or exceed	147	170	181	194	203	207
	$2\frac{1}{2}$ " " " " "	134	159	172	185	196	200
	5 " " " " "	122	148	164	177	189	194
	10 " " " " "	109	135	151	166	180	185
	15 " " " " "	100	126	142	159	174	179
	20 " " " " "	93	118	135	152	168	174
Upper Quartile	**25** " " " " "	**88**	**112**	**128**	**147**	**163**	**169**
	30 " " " " "	83	107	123	141	158	165
	40 " " " " "	75	97	113	131	147	156
Median	**50** " " " " "	**68**	**89**	**104**	**122**	**138**	**147**
	60 " " " " "	61	81	95	113	128	138
	70 " " " " "	54	73	86	103	118	128
Lower Quartile	**75** " " " " "	**51**	**69**	**81**	**98**	**112**	**122**
	80 " " " " "	47	64	76	92	105	115
	85 " " " " "	43	58	71	86	99	109
	90 " " " " "	38	52	63	79	90	100
	95 " " " " "	31	43	53	67	77	86
	$97\frac{1}{2}$ " " " " "	25	36	44	58	66	74
	99 " " " " "	20	30	35	48	55	63
	Number of cases for each grade	5582	9087	10881	6730	4206	4886

Total number of cases, 41,241. The norms apply to February.

It is often desirable to know more about a pupil than that he scores above or below the median for his grade. By the use of the percentile values given in Table 1, it is easy to find the approximate percentile rank of any pupil in comparison with other pupils of the same grade. This is always worth doing, but attention is called to the fact that a pupil's percentile rank within his grade is not an accurate index of *brightness*, since it does not take age into account. Age percentile values are not yet available, because of the difficulty of securing age groups above 14 years which have not been affected by various selective factors.

MENTAL AGE EQUIVALENTS [1]

Table 2 gives provisional mental age equivalents in terms of the Stanford-Binet Scale. These equivalents were determined by means of a comparison of scores of 306 pupils in the Terman Group Test

TABLE 2. MENTAL AGE EQUIVALENTS

TERMAN GROUP TEST SCORE	STANFORD-BINET MENTAL AGE	TERMAN GROUP TEST SCORE	STANFORD-BINET MENTAL AGE
210	19–6	110	14–10
205	19–3	105	14–7
200	19–0	100	14–4
195	18–9	95	14–1
190	18–7	90	13–11
185	18–4	85	13–8
180	18–1	80	13–5
175	17–10	75	13–2
170	17–7	70	12–11
165	17–5	65	12–9
160	17–2	60	12–6
155	16–11	55	12–3
150	16–8	50	12–0
145	16–5	45	11–9
140	16–3	40	11–6
135	16–0	35	11–4
130	15–9	30	11–1
125	15–6	25	10–10
120	15–3	20	10–7
115	15–1	15	10–4

[1] The author is indebted to Dr. Bird T. Baldwin of the University of Iowa for 182 of the 306 cases on which Table 2 is based, and to Dr. J. R. Stockton and Alice Cronin of the San Jose Normal School for the remaining 124. Both groups of children had been given many group tests and had probably become "test wise." For this reason, the mental age equivalents of Table 2 may be a little too high.

and in the Stanford-Binet Scale. They are considered to be fairly accurate.

Instructions for Finding Intelligence Quotient. Find mental age on Terman Group Test from Table 2. Then divide mental age in years and months by life age in years and months. Disregard life age above 16 years; that is, however much a pupil's age exceeds 16 years, the divisor is 16. The resulting quotient is the IQ.

Mental ages above 16 are to be considered rather as scores than as true mental ages. The use of these scores (above 16) as if they were true mental ages is merely a convenient device for securing an index of brightness (the IQ).

REMARKS

Attention is called to the fact that in the upper grammar grades and especially in the high school a large amount of selection occurs through the rapid elimination of pupils who are below average intelligence. As a result, the median intelligence quotient will usually be found considerably above 100 in the high school, and somewhat above 100 in the seventh and eighth grades. The selection is so great that it is impossible to derive valid age norms based entirely upon tests of pupils enrolled in the high school.

In determining the intelligence of pupils of any particular age in a given grade, the promotion rate, as well as elimination, is an important factor. For example, as might be expected, most twelve-year-old pupils in the eighth grade test far above the median for twelve-year-olds in general, and most sixteen-year-olds in the eighth grade test far below the median for sixteen-year-olds in general. That is, the pupil who is under-age for his grade usually has an IQ considerably above 100, the over-age pupil an IQ considerably below 100.

Teachers and principals will find it interesting to investigate the selective influence of school subjects. For example, the median intelligence scores of pupils enrolled in Latin or algebra is usually considerably above the median for pupils of the same year enrolled in shop work, domestic science, etc. The greater the amount of election permitted, the larger the differences among classes. There is a noticeable tendency for each pupil to find his proper level, though this process needs to be helped along by educational guidance based upon mental ability tests.

It is also interesting to compare the median scores of pupils whose parents belong to different social and occupational groups. Children

of the professional classes or of the superior economic classes usually average considerably above children of unskilled laborers. Other instructive comparisons can be made of pupils planning to enter different vocations, of pupils eliminated and pupils retained, of pupils getting high marks and pupils getting low marks, etc.

PUBLISHERS' NOTE

Professor Alexander Inglis, of the Graduate School of Education, Harvard University, who has made a special study of Tests and Measurements, has prepared a series of tables which are now published under the title *Intelligence Quotient Values*. These tables have a valuable use wherever intelligence quotients or educational quotients are to be derived from intelligence or achievement tests. By their aid, intelligence and educational quotients can be determined from scores on any test for which mental age or educational age norms have been established, without translation of mental and chronological ages into months and without the labor and inaccuracy involved by arithmetical operation.

In Table 2 of this Manual, mental age equivalents of scores are given, and if these scores are inserted at the top of the Inglis Tables in the corresponding mental age columns, intelligence quotients can then be read directly without translating the test scores into mental ages.

The price of *Intelligence Quotient Values* is $1.25. Orders should be addressed and checks made payable to the publishers, World Book Company, Yonkers-on-Hudson, New York.

The Inglis Tables have been revised to give mental and chronological ages in months only as well as in years and months. This form makes the tables equally convenient when mental or educational ages are expressed in months.

TERMAN GROUP TEST OF MENTAL ABILITY

For Grades 7 to 12

Prepared by Lewis M. Terman, Stanford University, California

EXAMINATION: FORM A

1. Name ..... (First name / Last name)
2. Boy or girl ..... Grade ..... High or Low .....
3. Age last birthday ..... Date of birthday ..... (Month / Day / Year)
4. Name of city (or county) .....
5. Name of school .....
6. Name of teacher .....
7. Date of this examination ..... 19..... (Month / Day / Year)

Do not turn the page until you are told to.

Test	Score	Remarks or Further Data
1. Information		
2. Best Answer		
3. Word Meaning		
4. Logical Selection		
5. Arithmetic		
6. Sentence Meaning		
7. Analogies		
8. Mixed Sentences		
9. Classification		
10. Number Series		
Total		

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TEST 1. INFORMATION

Draw a line under the ONE word that makes the sentence true, as shown in the sample.

SAMPLE. Our first President was
Adams Jefferson Lincoln Washington

1 Coffee is a kind of
bark berry leaf root 1
2 Sirloin is a cut of
beef mutton lamb veal 2
3 Gasoline comes from
grains petroleum turpentine seeds 3
4 Most exports go from
Boston San Francisco New Orleans New York . 4
5 The number of pounds in a ton is
1000 2000 3000 4000 5

6 Napoleon was finally defeated at
Leipzig Paris Verdun Waterloo 6
7 Emeralds are usually
blue green red yellow 7
8 The optic nerve is for
seeing hearing tasting feeling 8
9 Larceny is a term used in
medicine theology law pedagogy 9
10 Sponges come from
animals farms forests mines 10

11 Confucius founded the religion of the
Persians Italians Chinese Indians 11
12 The larynx is in the
abdomen head throat shoulder 12
13 The piccolo is used in
farming music photography typewriting 13
14 The kilowatt measures
rainfall wind-power electricity water-power 14
15 The guillotine causes
death disease fever sickness 15

16 A character in " David Copperfield " is
Sindbad Uriah Heep Rebecca Hamlet 16
17 A windlass is used for
boring cutting lifting squeezing 17
18 A great law-giver of the Hebrews was
Abraham David Moses Saul 18
19 A six-sided figure is called a
scholium parallelogram hexagon trapezium 19
20 A meter is nearest in length to the
inch foot yard rod 20

Right .....

TEST 2. BEST ANSWER

Read each question or statement and make a cross before the BEST answer, as shown in the sample.

SAMPLE

Why do we buy clocks? Because

1 We like to hear them strike.
2 They have hands.
× 3 They tell us the time.

1 **Spokes of a wheel are often made of hickory because**
1 Hickory is tough.
2 It cuts easily.
3 It takes paint nicely.

2 **The saying, "A watched pot never boils," means**
1 We should never watch a pot on the fire.
2 Boiling takes a long time.
3 Time passes slowly when we are waiting for something.

3 **A train is harder to stop than an automobile because**
1 It has more wheels.
2 It is heavier.
3 Its brakes are not so good.

4 **The saying, "Make hay while the sun shines," means**
1 Hay is made in summer.
2 We should make the most of our opportunities.
3 Hay should not be cut at night.

5 **If the earth were nearer the sun**
1 The stars would disappear.
2 Our months would be longer.
3 The earth would be warmer.

6 **The saying, "If wishes were horses, beggars would ride," means**
1 Wishing doesn't get us very far.
2 Beggars often wish for horses to ride.
3 Beggars are always asking for something.

7 **The saying, "Little strokes fell great oaks," means**
1 Oak trees are weak.
2 Little strokes are best.
3 Continued effort brings results.

8 **A steel battleship floats because**
1 The engines hold it up.
2 It has much air space inside.
3 It contains some wood.

9 **The feathers on a bird's wings help him to fly because**
1 They make a wide, light surface.
2 They keep the air off his body.
3 They decrease the bird's weight.

10 **The saying, "A carpenter should stick to his bench," means**
1 Carpenters should not work without benches.
2 Carpenters should not be idle.
3 One should work at the thing he can do best.

11 **The saying, "One swallow does not make a summer," means**
1 Swallows come back for the summer.
2 A single sign is not sufficient proof.
3 Many birds add to the pleasures of summer.

Right..... × 2 = *Score*.....

TEST 3. WORD MEANING

When two words mean the SAME, draw a line under "SAME."
When they mean the OPPOSITE, draw a line under "OPPOSITE."

SAMPLES	fall — drop	same — opposite	
	north — south	same — opposite	
1	expel — retain	same — opposite	1
2	comfort — console	same — opposite	2
3	waste — conserve	same — opposite	3
4	monotony — variety	same — opposite	4
5	quell — subdue	same — opposite	5
6	major — minor	same — opposite	6
7	boldness — audacity	same — opposite	7
8	exult — rejoice	same — opposite	8
9	prohibit — allow	same — opposite	9
10	debase — degrade	same — opposite	10
11	recline — stand	same — opposite	11
12	approve — veto	same — opposite	12
13	amateur — expert	same — opposite	13
14	evade — shun	same — opposite	14
15	tart — acid	same — opposite	15
16	concede — deny	same — opposite	16
17	tonic — stimulant	same — opposite	17
18	incite — quell	same — opposite	18
19	economy — frugality	same — opposite	19
20	rash — prudent	same — opposite	20
21	obtuse — acute	same — opposite	21
22	transient — permanent	same — opposite	22
23	expel — eject	same — opposite	23
24	hoax — deception	same — opposite	24
25	docile — submissive	same — opposite	25
26	wax — wane	same — opposite	26
27	incite — instigate	same — opposite	27
28	reverence — veneration	same — opposite	28
29	asset — liability	same — opposite	29
30	appease — placate	same — opposite	30

Right.....*Wrong*.....*Score*.....

FORM A

TEST 4. LOGICAL SELECTION

In each sentence draw a line under the TWO words that tell what the thing ALWAYS has. Underline TWO, and ONLY TWO, in each line.

SAMPLE. A man always has
body cap gloves mouth money

1 A horse always has
harness hoofs shoes stable tail 1
2 A circle always has
altitude circumference latitude longitude radius 2
3 A bird always has
bones eggs beak nest song 3
4 Music always has
listener piano rhythm sound violin 4
5 An object always has
smell size taste value weight 5

6 Conversation always has
agreement persons questions wit speech 6
7 A banquet always has
food music persons speeches toastmaster 7
8 A pistol always has
barrel bullet cartridge sights trigger 8
9 A ship always has
engine guns keel rudder sails 9
10 A debt always involves
creditor debtor interest mortgage payment 10

11 A game always has
cards contestants forfeits penalties rules 11
12 A magazine always has
advertisements paper pictures print stories 12
13 A museum always has
animals arrangement collections minerals visitors 13
14 A forest always has
animals flowers shade underbrush trees 14
15 A citizen always has
country occupation privileges property vote 15

16 Controversy always involves
claims disagreement dislike enmity hatred 16
17 War always has
airplanes cannons combat rifles soldiers 17
18 Obstacles always bring
difficulty discouragement failure hindrance stimulation .. 18
19 Abhorrence always involves
aversion dislike fear rage timidity 19
20 Compromise always involves
adjustment agreement friendship respect satisfaction ... 20

Right 19...

TEST 5. ARITHMETIC

Find the answers as quickly as you can.
Write the answers on the dotted lines.
Use the bottom of the page to figure on.

---

1 How many hours will it take a person to go 66 miles at the rate of 6 miles an hour? *Answer* ..11....

2 At the rate of 2 for 5 cents, how many pencils can you buy for 50 cents? *Answer* ..10.0.

3 If a man earns $20 a week and spends $14, how long will it take him to save $300? *Answer* ..30....

4 $2 \times 3 \times 4 \times 6$ is how many times as much as 3×4? *Answer* ..12....

5 If two pies cost 66 cents, what does a sixth of a pie cost? *Answer* ..6.9..

6 What is $16\frac{2}{3}$ per cent of $120? *Answer* $20...

7 4 per cent of $1000 is the same as 8 per cent of what amount? *Answer* $500

8 A has $180, B has $\frac{2}{3}$ as much as A, and C has $\frac{1}{2}$ as much as B. How much have all together? *Answer* $360

9 The capacity of a rectangular bin is 48 cubic feet. If the bin is 6 feet long and 4 feet wide, how deep is it? *Answer* ..2.1..

10 If it takes 7 men 2 days to dig a 140-foot ditch, how many men are needed to dig it in half a day? *Answer* ..28....

11 A man spends $\frac{1}{4}$ of his salary for board and room, and $\frac{3}{8}$ for all other expenses. What per cent of his salary does he save? *Answer* ..37½..

12 If a man runs 100 yards in 10 seconds, how many feet does he run in $\frac{1}{5}$ of a second? *Answer* ..6.1..

Right ..11.. × 2 = *Score* ..22..

FORM A

TEST 6. SENTENCE MEANING

Draw a line under the right answer, as shown in the samples.

SAMPLES	Is coal obtained from mines?	Yes	No	
	Are all men six feet tall?	Yes	No	
1	Does a conscientious person ever make mistakes?	Yes	No	1
2	Is an alloy a kind of musical instrument?	Yes	No	2
3	Is scurvy a kind of medicine?	Yes	No	3
4	Are mysterious things often uncanny?	Yes	No	4
5	Are destitute persons often subjects of charity?	Yes	No	5
6	Are anonymous letters ever properly signed?	Yes	No	6
7	Is the mimeograph sometimes used by stenographers?	Yes	No	7
8	Is a curriculum intended for horses?	Yes	No	8
9	Are proteids essential to health?	Yes	No	9
10	Does " perfunctory " mean the same as " careful "?	Yes	No	10
11	Are premeditated deeds always wicked?	Yes	No	11
12	Do alleged facts often require verification?	Yes	No	12
13	Are sheep carnivorous?	Yes	No	13
14	Are aristocrats subservient to their inferiors?	Yes	No	14
15	Are venerable people usually respected?	Yes	No	15
16	Is clematis sometimes cultivated?	Yes	No	16
17	Are ultimate results the last to appear?	Yes	No	17
18	Are cerebral hemorrhages helpful to thinking?	Yes	No	18
19	Are all people religious who have hallucinations?	Yes	No	19
20	Are intermittent sounds discontinuous?	Yes	No	20
21	Are sable colors preferred for nations' flags?	Yes	No	21
22	Does social contact tend to reduce eccentricities?	Yes	No	22
23	Are tentative decisions usually final?	Yes	No	23
24	Is rancor usually characterized by persistence?	Yes	No	24

Right 18 *Wrong* 0 *Score* 18

TEST 7. ANALOGIES

SAMPLES

Ear is to hear as eye is to
table see hand play

Hat is to head as shoe is to
arm coat foot leg

Do them all like samples.

---

1 Coat is to wear as bread is to
eat starve water cook 1

2 Week is to month as month is to
year hour minute century 2

3 Monday is to Tuesday as Friday is to
week Thursday day Saturday 3

4 Tell is to told as speak is to
sing spoke speaking sang 4

5 Lion is to animal as rose is to
smell leaf plant thorn 5

6 Cat is to tiger as dog is to
wolf bark bite snap 6

7 Success is to joy as failure is to
sadness luck fail work 7

8 Liberty is to freedom as bondage is to
negro slavery free suffer 8

9 Cry is to laugh as sadness is to
death joy coffin doctor 9

10 Tiger is to hair as trout is to
water fish scales swims 10

11 1 is to 3 as 9 is to
18 27 36 45 11

12 Lead is to heavy as cork is to
bottle weight light float 12

13 Poison is to death as food is to
eat bird life bad 13

14 4 is to 16 as 5 is to
7 45 35 25 14

15 Food is to hunger as water is to
drink clear thirst pure 15

16 b is to d as second is to
third later fourth last 16

17 City is to mayor as army is to
navy soldier general private 17

18 Here is to there as this is to
these those that then 18

19 Subject is to predicate as noun is to
pronoun adverb verb adjective 19

20 Corrupt is to depraved as sacred is to
Bible hallowed prayer Sunday 20

Right .....

FORM A

TEST 8. MIXED SENTENCES

The words in each sentence below are mixed up. If what a sentence means is TRUE, draw a line under "TRUE." If what it means is FALSE, draw a line under "FALSE."

SAMPLES	hear are with to ears	true	false	
	eat gunpowder to good is	true	false	
1	true bought cannot friendship be	true	false	1
2	good sea drink to is water	true	false	2
3	of is the peace war opposite	true	false	3
4	get grow they as children taller older	true	false	4
5	horses automobile an are than slower	true	false	5
6	never deeds rewarded be should good	true	false	6
7	four hundred all pages contain books	true	false	7
8	to advice sometimes is good follow hard	true	false	8
9	envy bad greed traits are and	true	false	9
10	grow an than strawberries oak tree higher	true	false	10
11	external deceive never appearances us	true	false	11
12	never is man what show a deeds	true	false	12
13	hatred bad unfriendliness traits are and	true	false	13
14	often judge can we actions man his by a	true	false	14
15	in are always American cities born presidents	true	false	15
16	certain always death of cause kinds sickness	true	false	16
17	are sheet blankets as as a never warm	true	false	17
18	never who heedless those stumble are	true	false	18

Right 12 *Wrong* 1 *Score* 11

TEST 9. CLASSIFICATION

SAMPLES
1 bullet cannon gun sword pencil
2 Canada Chicago China India France

In each line cross out the word that does not belong there. Cross out JUST ONE WORD in each line.

1	Frank James John Sarah William	1
2	Baptist Catholic Methodist Presbyterian Republican	2
3	automobile bicycle buggy telegraph train	3
4	Collie Holstein Shepherd Spitz Terrier	4
5	hop run skip stand walk	5
6	death grief picnic poverty sadness	6
7	bed chair dish sofa table	7
8	hard rough smooth soft sweet	8
9	mechanic doctor lawyer preacher teacher	9
10	Christ Confucius Mohammed Moses Cæsar	10
11	butterfly hawk ostrich robin swallow	11
12	cloth cotton flax hemp wool	12
13	digestion hearing sight smell touch	13
14	down hither recent up yonder	14
15	anger hatred joy pity reasoning	15
16	Australia Cuba Iceland Ireland Spain	16
17	Dewey Farragut Grant Paul Jones Schley	17
18	give lend lose keep waste	18

Right... 15 ...

FORM A

TEST 10. NUMBER SERIES

SAMPLES	5	10	15	20	25	30	35
	20	18	16	14	12	10	8

In each row try to find out how the numbers are made up, then on the two dotted lines write the TWO numbers that should come next.

1st Row			8	7	6	5	4	3	2 . . . 1
2d Row		3	8	13	18	23	28	33	38
3d Row		$11\frac{3}{4}$	12	$12\frac{1}{4}$	$12\frac{1}{2}$	$12\frac{3}{4}$	. . .	. . .	
4th Row			8	8	6	6	4	4	2 . . 2
5th Row			1	2	4	8	16	32	64 . 128
6th Row		4	3	5	4	6	5	7	6 . 8 . .
7th Row			16	8	4	2	1	$\frac{1}{2}$	. . . . .
8th Row		8	9	12	13	16	17	20	21
9th Row	7	11	15	16	20	24	25	29	33 . 34
10th Row	31.3	40.3	49.3	58.3	67.3	76.3	85.3	94.3	
11th Row				$\frac{1}{25}$	$\frac{1}{5}$	1	5	25	125
12th Row			3	4	6	9	13	18	24 . 31

Right . . . . . × 2 = *Score* . . . . . .

OTIS SELF-ADMINISTERING TESTS OF MENTAL ABILITY

By Arthur S. Otis, Ph.D.

Formerly Development Specialist with Advisory Board, General Staff, United States War Department

INTERMEDIATE EXAMINATION: FORM A

For Grades 4–9

20 Score.....

Read this page. Do what it tells you to do.

Do not open this paper, or turn it over, until you are told to do so. Fill these blanks, giving your name, age, birthday, etc. Write plainly.

Name..... Age last birthday..... years
(First name, initial, and last name)

Birthday..... Teacher..... Date..... 192...
(Month, Day)

Grade..... School..... City.....

This is a test to see how well you can think. It contains questions of different kinds. Here is a sample question already answered correctly. Notice how the question is answered:

Sample: Which one of the five words below tells what an apple is?
1 flower, 2 tree, 3 vegetable, 4 fruit, 5 animal.....(*4*)

The right answer, of course, is "fruit"; so the word "fruit" is underlined. And the word "fruit" is No. 4; so a figure 4 is placed in the parentheses at the end of the dotted line. This is the way you are to answer the questions.

Try this sample question yourself. Do not write the answer; just draw a line under it and then put its number in the parentheses:

Sample: Which one of the five things below is round?
1 a book, 2 a brick, 3 a ball, 4 a house, 5 a box.....( )

The answer, of course, is "a ball"; so you should have drawn a line under the words "a ball" and put a figure 3 in the parentheses. Try this one:

Sample: A foot is to a man and a paw is to a cat the same as a hoof is to a — what?
1 dog, 2 horse, 3 shoe, 4 blacksmith, 5 saddle.....( )

The answer, of course, is "horse"; so you should have drawn a line under the word "horse" and put a figure 2 in the parentheses. Try this one:

Sample: At four cents each, how many cents will 6 pencils cost?.....( )

The answer, of course, is 24, and there is nothing to underline; so just put the 24 in the parentheses.

If the answer to any question is a number or a letter, put the number or letter in the parentheses without underlining anything. Make all letters like printed capitals.

The test contains 75 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed half an hour after the examiner tells you to begin. Try to get as many right as possible. Be careful not to go so fast that you make mistakes. Do not spend too much time on any one question. No questions about the test will be answered by the examiner after the test begins. Lay your pencil down.

Do not turn this page until you are told to begin.

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EXAMINATION BEGINS HERE.

1. Which one of the five things below does not belong with the others? (Do not write on these dotted lines.)
   1 potato, 2 turnip, 3 carrot, 4 stone, 5 onion..... ( )
2. Which one of the five words below tells best what a saw is?
   1 something, 2 tool, 3 furniture, 4 wood, 5 machine..... ( )
3. Which one of the five words below means the opposite of west?
   1 north, 2 south, 3 east, 4 equator, 5 sunset..... ( )
4. A hat is to a head and a glove is to a hand the same as a shoe is to what?
   1 leather, 2 a foot, 3 a shoestring, 4 walk, 5 a toe..... ( )
5. A child who knows he is guilty of doing wrong should feel (?)
   1 bad, 2 sick, 3 better, 4 afraid, 5 ashamed..... ( )
6. Which one of the five things below is the smallest?
   1 twig, 2 limb, 3 bud, 4 tree, 5 branch..... ( )
7. Which one of the five things below is most like these three: cup, plate, saucer?
   1 fork, 2 table, 3 eat, 4 bowl, 5 spoon..... ( )
8. Which of the five words below means the opposite of strong?
   1 man, 2 weak, 3 small, 4 short, 5 thin..... ( )
9. A finger is to a hand the same as a toe is to what?
   1 foot, 2 toenail, 3 heel, 4 shoe, 5 knee..... ( )
10. Which word means the opposite of sorrow?
    1 sickness, 2 health, 3 good, 4 joy, 5 pride..... ( )
11. Which one of the ten numbers below is the smallest? (Tell by letter.)
    A 6084, B 5160, C 4342, D 6521, E 9703, F 4296, G 7475, H 2657, J 8839, K 3918 ( )
12. Which word means the opposite of pretty?
    1 good, 2 ugly, 3 bad, 4 crooked, 5 nice..... ( )
13. Do what this mixed-up sentence tells you to do.
    number Write the the in 5 parentheses..... ( )
14. If we believe some one has committed a crime, but we are not sure, we have a (?)
    1 fear, 2 suspicion, 3 wonder, 4 confidence, 5 doubtful..... ( )
15. A book is to an author as a statue is to (?)
    1 sculptor, 2 marble, 3 model, 4 magazine, 5 man..... ( )
16. Which is the most important reason that words in the dictionary are arranged alphabetically?
    1 That is the easiest way to arrange them. 2 It puts the shortest words first. 3 It enables us to find any word quickly. 4 It is merely a custom. 5 It makes the printing easier.. ( )
17. Which one of the five things below is most like these three: plum, apricot, apple?
    1 tree, 2 seed, 3 peach, 4 juice, 5 ripe..... ( )
18. At 4 cents each, how many pencils can be bought for 36 cents?..... ( )
19. If a person walking in a quiet place suddenly hears a loud sound, he is likely to be (?)
    1 stopped, 2 struck, 3 startled, 4 made deaf, 5 angered..... ( )
20. A boy is to a man as a (?) is to a sheep.
    1 wool, 2 lamb, 3 goat, 4 shepherd, 5 dog..... ( )
21. One number is wrong in the following series. What should that number be? (Just write the correct number in the parentheses.)
    1 6 2 6 3 6 4 6 5 6 7 6..... ( )
22. Which of the five things below is most like these three: horse, pigeon, cricket?
    1 stall, 2 saddle, 3 eat, 4 goat, 5 chirp..... ( )
23. If the words below were rearranged to make a good sentence, with what letter would the last word of the sentence begin? (Make the letter like a printed capital.)
    nuts from squirrels trees the gather..... ( )
24. A man who betrays his country is called a (?)
    1 thief, 2 traitor, 3 enemy, 4 coward, 5 slacker..... ( )
25. Food is to the body as (?) is to an engine.
    1 wheels, 2 fuel, 3 smoke, 4 motion, 5 fire..... ( )
26. Which tells best just what a pitcher is?
    1 a vessel from which to pour liquid, 2 something to hold milk, 3 It has a handle, 4 It goes on the table, 5 It is easily broken..... ( )

Do not stop. Go on with the next page.

27. If George is older than Frank, and Frank is older than James, then George is (?) James.
1 older than, 2 younger than, 3 just as old as, 4 (cannot say which) ..... ( )

28. Count each 7 below that has a 5 next after it. Tell how many 7's you count.
7 5 3 0 9 7 3 7 8 5 7 4 2 1 7 5 7 3 2 4 7 0 9 3 7 5 5 7 2 3 5 7 7 5 4 7 ..... ( )

29. If the words below were rearranged to make a good sentence, with what letter would the last word of the sentence begin? (Make the letter like a printed capital.)
leather shoes usually made are of ..... ( )

30. An electric light is to a candle as a motorcycle is to (?)
1 bicycle, 2 automobile, 3 wheels, 4 speed, 5 police ..... ( )

31. Which one of the words below would come first in the dictionary?
1 march, 2 ocean, 3 horse, 4 paint, 5 elbow, 6 night, 7 flown ..... ( )

32. The daughter of my mother's brother is my (?)
1 sister, 2 niece, 3 cousin, 4 aunt, 5 granddaughter ..... ( )

33. One number is wrong in the following series. What should that number be?
3 4 5 4 3 4 5 4 3 5 ..... ( )

34. Which of the five things below is most like these three: boat, horse, train?
1 sail, 2 row, 3 motorcycle, 4 move, 5 track ..... ( )

35. If Paul is taller than Herbert and Paul is shorter than Robert, then Robert is (?) Herbert.
1 taller than, 2 shorter than, 3 just as tall as, 4 (cannot say which) ..... ( )

36. What is the most important reason that we use clocks?
1 to wake us up in the morning, 2 to regulate our daily lives, 3 to help us catch trains, 4 so that children will get to school on time, 5 They are ornamental ..... ( )

37. A coin made by an individual and meant to look like one made by the government is called(?)
1 duplicate, 2 counterfeit, 3 imitation, 4 forgery, 5 libel ..... ( )

38. A wire is to electricity as (?) is to gas.
1 a flame, 2 a spark, 3 hot, 4 a pipe, 5 a stove ..... ( )

39. If the following words were arranged in order, with what letter would the middle word begin?
Yard Inch Mile Foot Rod ..... ( )

40. One number is wrong in the following series. What should that number be?
5 10 15 20 25 29 35 40 45 50 ..... ( )

41. Which word means the opposite of truth?
1 cheat, 2 rob, 3 liar, 4 ignorance, 5 falsehood ..... ( )

42. Order is to confusion as (?) is to war.
1 guns, 2 peace, 3 powder, 4 thunder, 5 army ..... ( )

43. In a foreign language, good food = Bano Naab
good water = Heto Naab
The word that means *good* begins with what letter? ..... ( )

44. The feeling of a man for his children is usually (?)
1 affection, 2 contempt, 3 joy, 4 pity, 5 reverence ..... ( )

45. Which of the five things below is most like these three: stocking, flag, sail?
1 shoe, 2 ship, 3 staff, 4 towel, 5 wash ..... ( )

46. A book is to information as (?) is to money.
1 paper, 2 dollars, 3 bank, 4 work, 5 gold ..... ( )

47. If Harry is taller than William, and William is just as tall as Charles, then Charles is (?) Harry.
1 taller than, 2 shorter than, 3 just as tall as, 4 (cannot say which) ..... ( )

48. If the following words were arranged in order, with what letter would the middle word begin?
Six Ten Two Eight Four ..... ( )

49. If the words below were rearranged to make a good sentence, with what letter would the third word of the sentence begin? (Make the letter like a printed capital.)
men high the a wall built stone ..... ( )

50. If the suffering of another makes us suffer also, we feel (?)
1 worse, 2 harmony, 3 sympathy, 4 love, 5 repelled ..... ( )

51. In a foreign language, grass = Moki
green grass = Moki Laap
The word that means *green* begins with what letter? ..... ( )

Do not stop. Go on with the next page.

52. If a man has walked west from his home 9 blocks and then walked east 4 blocks, how many blocks is he from his home? ( )

53. A pitcher is to milk as (?) is to flowers.
1 stem, 2 leaves, 3 water, 4 vase, 5 roots ( )

54. Do what this mixed-up sentence tells you to do.
sum three Write two the four and of ( )

55. There is a saying, "Don't count your chickens before they are hatched." This means (?)
1 Don't hurry. 2 Don't be too sure of the future. 3 Haste makes waste. 4 Don't gamble ( )

56. Which statement tells best just what a fork is?
1 a thing to carry food to the mouth, 2 It goes with a knife, 3 an instrument with prongs at the end, 4 It goes on the table, 5 It is made of silver ( )

57. Wood is to a table as (?) is to a knife.
1 cutting, 2 chair, 3 fork, 4 steel, 5 handle ( )

58. Do what this mixed-up sentence tells you to do.
sentence the letter Write last this in ( )

59. Which one of the words below would come last in the dictionary?
1 alike, 2 admit, 3 amount, 4 across, 5 after, 6 amuse, 7 adult, 8 affect ( )

60. There is a saying, "He that scatters thorns, let him go barefoot." This means (?)
1 Let him who causes others discomforts bear them himself also. 2 Going barefoot toughens the feet. 3 People should pick up what they scatter. 4 Don't scatter things around ( )

61. If the following words were arranged in order, with what letter would the middle word begin?
Plaster Frame Wallpaper Lath Foundation ( )

62. In a foreign language,
many boys = Boka Hepo
many girls = Marti Hepo
many boys and girls = Boka Ello Marti Hepo
The word that means *and* begins with what letter? ( )

63. A statement which expresses just the opposite of that which another statement expresses is said to be a (?)
1 lie, 2 contradiction, 3 falsehood, 4 correction, 5 explanation ( )

64. There is a saying, "Don't look a gift horse in the mouth." This means (?)
1 It is not safe to look into the mouth of a horse. 2 Although you question the value of a gift, accept it graciously. 3 Don't accept a horse as a gift. 4 You cannot judge the age of a gift horse by his teeth ( )

65. Which one of the words below would come last in the dictionary?
1 hedge, 2 glory, 3 label, 4 green, 5 linen, 6 knife, 7 honor ( )

66. Which statement tells best just what a watch is?
1 It ticks, 2 something to tell time, 3 a small, round object with a chain, 4 a vest-pocket-sized time-keeping instrument, 5 something with a face and hands ( )

67. Ice is to water as water is to what?
1 land, 2 steam, 3 cold, 4 river, 5 thirst ( )

68. Which statement tells best just what a window is?
1 something to see through, 2 a glass door, 3 a frame with a glass in it, 4 a glass opening in the wall of a house, 5 a piece of glass surrounded by wood ( )

69. Which of the five words below is most like these three: large, red, good?
1 heavy, 2 size, 3 color, 4 apple, 5 very ( )

70. Write the letter that follows the letter that comes next after M in the alphabet ( )

71. One number is wrong in the following series. What should that number be?
1 2 4 8 16 24 64 ( )

72. An uncle is to an aunt as a son is to a (?)
1 brother, 2 daughter, 3 sister, 4 father, 5 girl ( )

73. If I have a large box with 3 small boxes in it and 4 very small boxes in each of the small boxes, how many boxes are there in all? ( )

74. One number is wrong in the following series. What should that number be?
1 2 4 5 7 8 10 11 12 14 ( )

75. There is a saying, "Don't ride a free horse to death." This means (?)
1 Don't be cruel. 2 Don't abuse a privilege. 3 Don't accept gifts. 4 Don't be reckless. ( )

If you finish before the time is up, go back and make sure that every answer is right.

Psych
P850

PORTFOLIO OF
INTELLIGENCE TESTS

First Revision

* * *

Published by
WORLD BOOK COMPANY
YONKERS-ON-HUDSON, NEW YORK
AND CHICAGO, ILLINOIS

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PORTFOLIO OF INTELLIGENCE TESTS

(*First Revision*)

PUBLISHED BY WORLD BOOK COMPANY

This portfolio is intended to show briefly the nature of the intelligence tests published by World Book Company.

As shown in the list on the next page and in the *Catalog of Standard Tests*, some of the tests are published in two or more forms, called Form A, Form B, etc. In the interest of compactness, however, only one form of each test is included in this portfolio. Each item that is included is marked with a star (*) in the following list.

Each test is accompanied by a Manual of Directions. In some cases the Manual is included in the package of tests; in other cases it must be ordered separately. Each test in this portfolio is accompanied by the Manual, with the exception of the Goodenough Intelligence Test, the Herring Revision of the Binet-Simon Tests, the Miller Mental Ability Test, and Scale B of the National Intelligence Tests.

Each package of tests contains also a Key for use in scoring, and a Class Record. In general, the correct answers to the tests are so spaced on the Key as to fit exactly the spacing of the responses on the test paper, in order to make the scoring more convenient and accurate. The Key for Scale A, Form 1, of the National Intelligence Tests, and the Class Record are included in this portfolio as samples.

The Otis Classification Test is included, since Part II of this test is a measure of mental ability.

The contents of each package of Form B of a test (or of Form C) is the same as the contents of a package of Form A of the test.

A specimen set is an envelope containing one of each item pertaining to a test (usually a copy of Form A of the test, a copy of Form B, a Manual of Directions, a Key, and a Class Record). When a test is published in more than two forms, only Forms A and B are included in the specimen set.

Attention is invited to suggestions given on page 3 of the *Catalog of Standard Tests*, to insure promptness and accuracy in filling orders.

LIST OF INTELLIGENCE TESTS

The starred items are shown in this portfolio.

Detroit Advanced First-Grade Intelligence Test.

* **Examination: Form A.** Package of 25 examination booklets, including * Manual of Directions, Key, and Class Record, $1.10 net.

Specimen Set. Price 10 cents postpaid.

Detroit First-Grade Intelligence Test.

* **Examination: Form A.** Package of 25 examination booklets, with * Manual of Directions and Key, and Class Record, $1.10 net.

Specimen Set. Price 10 cents postpaid.

Detroit Kindergarten Test.

* **Examination: Form A.** Package of 25 examination booklets, with * Manual of Directions and Class Record, $1.00 net.

Specimen Set. Price 10 cents postpaid.

Goodenough Intelligence Test.

* **Children's Drawing Sheet.** Package of 25, with Key and Mental Age Equivalents of Scores, and Class Record, 60 cents net.

Measurement of Intelligence by Drawings. The author's book containing directions for administering and scoring. Price $1.80 postpaid.

Haggerty Intelligence Examination.

* **Delta 1.** Package of 25 examination booklets, with * Manual of Directions and Class Record, $1.25 net.

Key for Delta 1. Card. Price 10 cents net.

* **Delta 2.** Package of 25 examination booklets, with * Manual of Directions, Key, and Class Record, $1.10.

Specimen Set. Price 50 cents postpaid.

Herring Revision of the Binet-Simon Tests.

Examination Manual: Form A. Cloth. 56 pages. Price $1.00 net. * (Specimen pages only included in portfolio.)

Individual Record Card. Package of 25 cards, $1.00 net.

Miller Mental Ability Test.

* **Examination: Form A.** Package of 25 examination booklets, including Key and Age-Grade-Score Sheet and Percentile Graph, 80 cents net.

Examination: Form B. Package, 80 cents net.

Manual of Directions. 24 pages. Price 15 cents net.

Specimen Set. Price 25 cents postpaid.

National Intelligence Tests.

* **Scale A: Form 1.** Package of 25 examination booklets, with * Manual of Directions, * Key, and * Class Record, $1.25 net.

Scale A: Form 2. Package, $1.25 net.

Scale A: Form 3. Package, $1.25 net.

* **Scale B: Form 1.** Package, $1.25 net.

Scale B: Form 2. Package, $1.25 net.

Scale B: Form 3. Package, $1.25 net.

Specimen Set. Price 45 cents postpaid.

Otis Classification Test.

* **Examination: Form A.** Package of 25 examination booklets, with * Manual of Directions, Key, Interpretation Chart and Percentile Graph, and Class Record, $1.10 net.

Examination: Form B. Package, $1.10 net.

Examination: Form C. Package, $1.10 net.

Specimen Set. Price 40 cents postpaid.

Otis Group Intelligence Scale.

* **Primary Examination: Form A.** Package of 25 examination booklets, with * Manual of Directions and Class Record, $1.10 net.

Primary Examination: Form B. Package, $1.10 net.

* **Advanced Examination: Form A.** Package of 25 examination booklets, with * Manual of Directions, Key, and Class Record, $1.25 net.

Advanced Examination: Form B. Package, $1.25 net.

Specimen Set. Price 50 cents postpaid.

Otis Self-Administering Tests of Mental Ability.

* **Intermediate Examination: Form A.** Package of 25 examination booklets, with * Manual of Directions and Key, Interpretation Chart and Percention Graph, and Class Record, 80 cents net.

Intermediate Examination: Form B. Package, 80 cents net.

Intermediate Examination: Form C. Package, 80 cents net.

Intermediate Examination: Form D. Package, 80 cents net.

* **Higher Examination: Form A.** Package of 25 examination booklets, with * Manual of Directions and Key, Interpretation Chart and Percentile Graph, and Class Record, 80 cents net.

Higher Examination: Form B. Package, 80 cents net.

Higher Examination: Form C. Package, 80 cents net.

Higher Examination: Form D. Package, 80 cents net.

Specimen Set. Price 30 cents postpaid.

Pintner-Cunningham Primary Mental Test.

* **Examination: Form A.** Package of 25 examination booklets, with * Manual of Directions and Key, Percentile Graph, and Class Record, $1.25 net.

Specimen Set. Price 15 cents postpaid.

Terman Group Test of Mental Ability.

* **Examination: Form A.** Package of 25 examination booklets, with * Manual, Key, and Class Record, $1.20 net.

Examination: Form B. Package, $1.20 net.

Specimen Set. Price 15 cents postpaid.

OTIS SELF-ADMINISTERING TESTS OF MENTAL ABILITY

By Arthur S. Otis, Ph.D.
Formerly Development Specialist with Advisory Board, General Staff, United States War Department

MANUAL OF DIRECTIONS AND KEY (*Revised*)

For Intermediate and Higher Examinations

Contents

	PAGE
Introductory	1
Special Features	1
Historical	1
Acknowledgments	2
Directions for Administering	2
Directions for Scoring	2
Recording Scores	3
Standardization	3
Practice Effect	3
Interpretation of Results	3
Application of Results	8
The Percentile Graph	10
Directions for Drawing a Percentile Curve	11
Reliability and Validity	12

Introductory

Contents. In this manual will be found the complete directions for administering and scoring the Intermediate and Higher Examinations, directions for interpreting the scores in the light of the educational problems which the tests will help solve, and directions for applying the results of the test to the solution of those problems.

Scope. The Higher Examination together with the Intermediate Examination constitute the Otis Self-Administering Tests of Mental Ability, covering the range from the 4th grade to the university. The Higher Examination is designed for high school students and college freshmen. The Intermediate Examination is designed for Grades 4 to 9. The Higher and Intermediate Examinations are similar in form, but they differ in content and difficulty.

Forms. Each examination is issued in four alternative forms, Forms A, B, C, and D, alike except in content.

Special Features

Self-administration. In each of these examinations provision is made for the student to read for himself on the first page of the examination booklet all the directions needed for the examination. As the 75 items constituting each examination are in a single list, these are answered by the examinee without interruption. The examiner, therefore, has merely to distribute the blanks, see that all understand the printed directions, and give the signal to begin. He may then leave the class in charge of an assistant. For this reason the tests have been called "self-administering" tests.

Simplified scoring. In addition to the underlining of the correct one of several alternative answers, as is customary in group tests of mental ability, provision is made in these examinations for placing the number of the answer in a single column at the edge of each page. This simplifies the scoring to the extent that the whole examination can be scored in less than one minute.

Variety of test material. The form of the examinations admits of the use of a wide variety of types of questions instead of the limited number of types in the ordinary examination.

Flexible time limit. Provision is made for administering the examinations with a time limit of either 20 or 30 minutes. The 20-minute time limit may be used for general survey purposes or with normal school and college students. The 30-minute time limit should be used when time allows, as it will give a more accurate measure.

Ease of figuring IQ's. A chart is provided by which the IQ of the examinee can be found directly from the score and age in years and months merely by locating a point on the intersection of two lines. No arithmetical calculation or reference to tables is necessary.

Improved Percentile Graph. There is provided in each package of Examinations a new form of percentile graph on which percentile curves may be drawn, if desired, showing vividly the distributions of scores of any group or groups of examinees. With each percentile graph is furnished a scale chart by which the drawing of the percentile curves is reduced to the simplest terms.

Interpretation Chart. A chart is provided upon which the scores of a class or school may be plotted and the pupils divided into fast-moving, regular, and slow-moving groups and regraded within these groups, or otherwise classified, merely by drawing lines on the chart. Account is taken of mental ability, brightness, and chronological age in classifying by this method. It is not necessary to use the Interpretation Chart in order to interpret scores in these tests. However, it will be found a distinct aid and convenience.

Historical

These examinations are modeled after a group test of mental ability designed by the author in January, 1918, for use in a large commercial establishment in Connecticut. In that test the principle of self-administration was embodied, involving the single list of questions, the printed initial directions, and the provision for answers in single columns.

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KEY
Higher
Form D
Page 2

1. (3)
2. (20)
3. (2)
4. (G)
5. (T)
6. (4)
7. (2)
8. (5)
9. (540)
10. (2)
11. (4)
12. (3)
13. (1)
14. (4)
15. (2)
16. (4)
17. (4)
18. (8)
19. (3)
20. (31)
21. (3)
22. (1)
23. (2)
24. (2)
25. (5)

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The author is indebted to many persons for helpful suggestions and criticisms in connection with the Self-Administering Tests of Mental Ability. Special mention is due the following, who gave hearty coöperation in the administration of tests for standardization purposes: Mr. J. C. Amon, Bellevue, Pennsylvania; Mr. H. H. Murphy, Hastings, New York; Mr. T. H. Schutte, State Teachers' College, Moorhead, Minnesota; Dr. John P. Herring, Bloomsburg State Normal School, Bloomsburg, Pennsylvania; Dr. Virgil E. Dickson, Oakland, California; Dr. E. E. Lewis, Rockford, Illinois; Mr. Henry D. Rinsland, Ardmore, Oklahoma; Mr. E. D. Price, Enid, Oklahoma; and Mr. Franklin Thomas, Professor of Civil Engineering, California Institute of Technology, Pasadena, California. Mrs. Otis has devoted many hours to scoring, tabulating, and correlating.

The author is indebted to Dr. E. E. Keener, Director of Instructional Research, Chicago Public Schools, and C. Everett Myers, Research Secretary, Pennsylvania State Education Association, for assistance in standardizing Form C.

DIRECTIONS FOR ADMINISTERING

Who may administer examination. Any teacher after a little preparation can satisfactorily administer either the Intermediate or Higher Examination. The best preparation for administering either is to take it. The principal should invite his teachers to take the examination and score their own papers. Any teacher who is interested in mental-ability testing should welcome the opportunity to experience the taking of an examination, as this will give her the best appreciation of what the examination tests. Those administering an examination should realize that it is very important that conditions be uniform throughout the school and must be the same in the school being tested as in every other school where the examination has been given. For this reason, everything which needs to be said in administering the test is given below in boldface type, and the teacher should give these instructions verbatim, reading if necessary. If one teacher urges the students to work as rapidly as possible and another teacher urges them to work as carefully as possible, the results may be entirely different and not comparable. The teacher, therefore, should say nothing that is not prescribed, except to make clear the meaning of what is on the first page of the examination blank.

When to give examination. The best time to give the examination is probably at the opening of school in the morning, although the time of day probably does not have a serious effect upon the score.

Directions for administering. To administer either the Intermediate or the Higher Examination, Form A, B, C, or D, begin by addressing the students as follows:

"**We are going to give you this morning [afternoon] some new and interesting tests. We will now pass the test papers and as soon as you receive a paper you may begin to read the first page and do as it directs, filling the blanks, etc. Do not open or turn over the paper. Part of the test is to see if you can follow directions.**"

Have monitors pass the papers, one to each student, right side up. See that every student is supplied with two pencils (or a pen) and an eraser.

Allow a reasonable time for all to finish reading the first page and trying the samples. A few laggards may be disregarded. Then say, "**Is there any one who does not understand the first page?**" Give any explanations necessary to make sure that all understand what is explained on the first page.

If a time limit of 20 minutes is to be used, say, "**This will be a short test. You will be told to stop at the end of 20 minutes instead of 30. Find the number 20 in the upper left-hand corner of the page and make a ring around it.**" Be sure that all do this.

Then say, "**Now turn the page and begin,**" and note the exact time. No further instructions are necessary.

If the principal or superintendent is administering the examination, he may now leave the class in charge of the teacher or an assistant, with instructions to give no further directions and answer no questions; to stop the work at the end of exactly 30 (or 20) minutes and have the papers collected. The person in charge during the examination will do well to move quietly about the room at the beginning of the examination and see that all are indicating the answers in a proper manner. If an examinee is found who is not placing the numbers in the parentheses, he should be told to do so.

DIRECTIONS FOR SCORING

The correct answers to the 75 items of both forms of the Intermediate and Higher Examinations are given on the margins of this manual. To score the examination, open the manual to the pages containing the answers to the form of the examination to be scored, fold open the manual and clip the pages together. Place the manual over the examination paper so that the appropriate Key is adjacent to the answers given on the examination paper. Place a check mark after each correct answer or a cross after each incorrect or omitted answer, or both checks and crosses.

If two answers are given for any one item, count the item wrong. This is quite likely to occur with Item 55 in Form A of the Higher Examination.

Number 37 in Form A and Number 57 in Form B of the Higher Examination count as wrong if the alphabet has been marked in any way.

If a paper is found in which the examinee has omitted to place the numbers in the parentheses but has otherwise indicated the answers, the scorer should write in the parentheses the numbers representing the answers of the examinee so far as these may be determined, and then score accordingly, but deduct one point from the total score for failure to follow the direction to place the numbers in the parentheses.

If the examinee has failed to make all his letters like printed capitals, score the paper as if all letters were printed capitals, but deduct one point for failure to follow the direction.

Whenever an examinee has used an irregular method of taking the examination, score the paper according to the obvious intent of the examinee and then deduct one point for each general direction not followed. Indicate such deduction by placing a -1 with a circle around it opposite the first instance where the direction has not been followed. Let his score represent the fairest measure of his ability that can be estimated.

The score in the examination is the number of correct answers. First, count up the correct answers and write the number on

the margin of the last page. Then verify the score by counting the incorrect and omitted answers. Thus, suppose the number of correct answers counted is 40. Count the incorrect and omitted answers beginning 41, 42, etc., and see that you end with 75. Then enter the score in the space provided on the first page of the blank. Do not trust the counting of correct answers only, as it is very easy to make a mistake. The checking of correct answers should be gone over by a second scorer, for even the best scorers will make mistakes.

Recording Scores

The Class Record. The scores should be entered on the Class Record which is provided with each package of examination blanks. Before entering the scores, arrange the papers of a class either in alphabetical order or in the order of magnitude of the score, according to preference. Next, enter the name of each student and his age in years and months. Then enter his score in the proper column according to the time limit used. Directions for filling the remaining columns will be given under "Interpretation of Results."

20-Minute time limit. If a 20-minute time limit has been used, the scores may be transmuted into terms of 30-minute time-limit scores in order that they may be compared with norms or other 30-minute scores. This may be done by means of Table 1.

TABLE 1[1]

20-MIN.	30-MIN.	20-MIN.	30-MIN.	20-MIN.	30-MIN.	20-MIN.	30-MIN.	20-MIN.	30-MIN.
1	1	16	20	31	40	46	59	61	71
2	2	17	22	32	41	47	60	62	71
3	4	18	23	33	43	48	61	63	72
4	5	19	24	34	44	49	62	64	72
5	6	20	26	35	45	50	63	65	73
6	7	21	27	36	46	51	64	66	73
7	9	22	28	37	48	52	64	67	74
8	10	23	30	38	49	53	65	68	74
9	11	24	31	39	50	54	66	69	74
10	13	25	32	40	51	55	67	70	75
11	14	26	33	41	53	56	68	71	75
12	15	27	35	42	54	57	68	72	75
13	17	28	36	43	55	58	69	73	75
14	18	29	37	44	56	59	70	74	75
15	19	30	39	45	58	60	70	75	75

Standardization

Selection of items. In selecting items for the Intermediate and Higher Examinations, the Advanced Examination was drawn upon freely. An equal number of items of other types, some of which are new, were included in order that the examination might cover a large variety of questions and therefore afford a more comprehensive measure of mental ability. Preliminary editions containing more than enough items were administered to about 1000 high school students in Oakland, California, and Rockford, Illinois, and to 1000 grammar school pupils in Moorhead, Minnesota. These students were divided in each case into two groups, a "good group" and a "poor group." The same number were taken from each grade for both groups. The good group constituted the young students, and the poor group the old students. These groups had reached the same average educational status, therefore, but at different rates. Now it is the rate at which a student can progress through school that the mental-ability test is chiefly used to predict. Therefore this is believed to be the best criterion by which to judge the validity of each item that goes into the test. The number of times each item was passed by each group was then found and only those items chosen which showed a distinct gain in number of passes by the good group over the number of passes by the poor group in spite of the fact that the median age of the good group was over two years less than that of the poor group. Each item justified its inclusion, therefore, because it distinguished between students who progressed slowly and those who progressed rapidly.

Arrangement in order of difficulty. The items in each form of each examination have been arranged in the order of difficulty, according to the number of passes of each item by the students taking the preliminary editions.

Practice Effect

Whenever a second form of a test is given after a first form, especially when the two forms have been made very much alike, students tend to do better on the second test. The effect of the first test is generally termed "practice effect," but it may include a number of effects. Among these is general familiarity with the method, resulting in ability to get under way more quickly, lessened nervousness, memory of mode of attack of certain types of problems, etc.

A study was made of the effect of practice when a second form of the Intermediate or Higher Examination was given the next day after the first form. The average gain in the second score was 4 points in each case. Therefore in such a case 4 points would have to be subtracted from the score in the second test to make allowance for the effect of practice.

Interpretation of Results

Mental ability and brightness. There are two aspects of the mental quality of an individual which must not be confused. One is his degree of **mental ability** and the other his degree of **brightness.** The term "mental ability" refers to that innate mental quality which increases with age, whereas the term "brightness" refers to that constant quality which determines the rate of growth of the mental ability of an individual and the degree of mental ability which he will eventually reach.

Mental ability is measured by the individual's score in the test. A measure of his brightness is obtained by comparing his score with that of others of his own age. The distinction is best shown by reference to the Interpretation Chart.

The Interpretation Chart. An Interpretation Chart is provided in each package of Examinations to facilitate the interpretation of scores. Interpretation Charts for the Intermediate and Higher Examinations are given on the two sides of the same sheet. In the sample Interpretation Chart shown in Figure 1 (page 9) a point is plotted for each of the 276 pupils in Grades 5 to 8 of a grammar school. The height of each point

1. (4)
2. (2)
3. (3)
4. (2)
5. (5)
6. (3)
7. (4)
8. (2)
9. (1)
10. (4)
11. (H)
12. (2)
13. (5)
14. (2)
15. (1)
16. (3)
17. (3)
18. (9)
19. (3)
20. (2)
21. (6)
22. (4)
23. (T)
24. (2)
25. (2)
26. (1)

[1] This table was derived from a study of 20- and 30-minute scores in the Higher Examination only. It is therefore only approximate for the Intermediate Examination. It is assumed, however, that the 20-minute time limit will seldom be used with the Intermediate Examination.

represents the score of an individual in the Intermediate Examination according to the scale at the left. The horizontal position of each point represents the age of the individual according to the scale at the foot of the chart.

The normal or "average" individual of the age of just 10 years is expected to make a score of just 23 points.[1] The normal individual of the age of just 11 years is expected to make a score of just 31 points, etc., as indicated by the heavy curved line through the middle of the chart (best seen in the blank chart). This may be called the normal curve and shows the **norm** or normal score to be expected from an individual of any given age. The curve becomes level at the age of 18 years, as shown in the Interpretation Chart for the Higher Examination, and may be considered as extending to the right indefinitely beyond 18 years at the same level. The derivation of this curve will be described below.

Mental maturity. A child's mental ability increases from birth, year by year, month by month, just as does his height, until he reaches his maximum, when he is said to have reached mental maturity. The normal curve may be thought of as the curve of growth in mental ability of the hypothetical exactly normal individual.

The age at which mental maturity is reached is difficult to decide, since the amount of mental development during the last year in which there is any development is very slight. In the Interpretation Chart for the Higher Examination the age at which mental maturity is reached is taken to be 18 years.

While individuals may reach mental maturity at about the same age, they nevertheless reach it with widely differing amounts of mental ability, just as they reach mature adult stature at differing heights. The degree of mental ability at which the normal individual reaches mental maturity is also very difficult to determine, since it is not possible to obtain a large group of completely unselected individuals (chosen at random from the whole population) at the various ages between 15 and 18. The norm for adults (persons of 18 years or over), however, has been called 42 in the Higher Examination, as shown by the upper limit of the normal curve. This is the equivalent of 59 points in the Intermediate Examination. The choice of this norm for adults is only an estimate based on all available data.

Derivation of norms. The positions of the normal curves in the two charts were established according to the judgment of the author upon consideration of (1) the median scores of the various age groups among about 120,000 pupils whose scores in the Higher or Intermediate Examinations have been reported to date, (2) the median scores of the several grade groups in relation to the median ages of these grade groups, (3) the norms for the various ages obtained from the norm table for the Advanced Examination by means of tables for converting scores into terms of the Higher and Intermediate Examinations, (4) the correlations between scores in the Higher and Intermediate Examinations and mental ages by the Herring Revision of the Binet-Simon Tests, and (5) correspondence between the Intermediate and Higher Examinations themselves. The position of the normal curve in neither chart accords exactly with any of these data, but it constitutes in either case a sort of average of the various groups of data.

[1] Unless otherwise stated the score referred to is the 30-minute time-limit score.

The aim has been to establish scores which are normal for unselected age groups, not merely for public school pupils. The scores of high school students, therefore, tend to average somewhat higher than the norms.

True mental age. Originally the term "mental age" referred to the degree of mental ability which is normal for a given age. Thus, "having a mental age of 15 years" meant "having a degree of mental ability just normal for the age of 15 years." This degree of mental ability is measured by a score of 36 in the Higher Examination. Having a mental age of 17, according to this definition, meant making a score just normal for 17-year-olds, which is a score of 41. Mental ages so found may be called true mental ages. Since the score of 42 is the norm for adults (taken to mean any person of 18 years or over), there is no age for which a score above 42 is the norm; therefore, of course, no score above 42 can be expressed as a true mental age.

The term "Mental Age" (capitalized), however, has now come to have a special meaning and to denote measures of mental ability — i.e., scores — in the Binet-Simon Tests. Binet Mental Ages below about 13 years are true mental ages. Above that, especially above 16 years, they are merely scores. They are called Mental Ages merely for the sake of consistency. The Binet Mental Age of 17, for example, represents a degree of mental ability considerably above that which is normal for the age of 17 or, indeed, for any age.

The Binet Mental Age of 16 years is generally taken as the norm for adults in figuring IQ's. There is a growing opinion among psychologists, however, that the Binet Mental Age which is the norm for adults is appreciably lower than 16 years.[1] The correlations between the Binet Scale and the Higher Examination confirm this belief. The correspondence between Binet Mental Ages and Scores in the Higher Examination, as indicated in the Interpretation Chart, is based partly upon the correlation between the Higher Examination and the Herring Revision of the Binet-Simon Tests and partly upon the age norms. At any rate, Binet Mental Ages appear to express degrees of mental ability in excess of that normal for the corresponding chronological ages even below the age of 15 years. For this reason IQ's obtained by the method provided herein [2] may be slightly higher than those obtained by the Binet Scale for the older students, but it is believed that they more nearly correspond with what the Binet IQ's of these students were when they were younger.[3]

Measures of mental ability. Each of the six scales at the left side of the Interpretation Chart for the Higher Examination is a measure of mental ability. The scales are so placed that values having the same height are corresponding measures of mental ability as far as may be determined. Thus a score of 40 points in the Higher Examination with a 30-minute time limit is the equivalent of a score of 31 in the Higher Examination with a 20-minute time limit, a score of 57 in the Intermediate Examination, a score of 120 in the Advanced Examination, a Binet Mental Age of 15 years 0 months, and a T-score of 62.[4]

[1] See Lewis M. Terman, "Mental Growth and the IQ," *Journal of Educational Psychology*, September, 1921.

[2] See "Measures of brightness" below.

[3] See "Validity of Mental Age equivalents" below.

[4] For the meaning and significance of a T-score, see William A. McCall, "A Uniform Method of Scale Construction," *Teachers College Record*, January, 1921.

Any individual whose score is plotted above the normal curve may be considered as brighter than normal, and any individual whose score is plotted below the normal curve may be considered as duller than normal.[1] The distance at any point above or below the normal curve is a measure of the brightness of the individual. A 14-year student making a score of 35 in the Higher Examination has a lesser degree of mental ability but a greater degree of brightness than a 15-year student making a score of 37.

Measures of brightness. Brightness is generally measured in terms of the Intelligence Quotient (IQ), which is customarily found by dividing the individual's Binet Mental Age by his chronological age (decimal point dropped). In the case of mental-ability tests other than the Binet Tests it is customary to give Binet Mental Age equivalents of scores in order that these may be used in finding IQ's. It has been found, however, that IQ's so derived have an appreciably wider range than those obtained by means of the Binet Tests and are therefore not comparable with the latter. Now the IQ was invented for use with the Binet Tests and should retain its original significance, or else it will become relatively meaningless. It seems that the term " Intelligence Quotient " is coming to have a legal recognition, but IQ's as sometimes derived from group tests of mental ability bear little relation to IQ's derived by the Binet Tests. It is the purpose of the author to use the term " IQ " only in its original significance.

Unless it is distinctly understood how IQ's were derived in any case, however, they should be designated by some means such as National IQ's, Otis IQ's, or Binet IQ's. The term " IQ," when not so qualified or understood, must be interpreted as referring to actual Intelligence Quotients found by means of the Binet Tests.

Validity of Mental Age equivalents. It follows from the above statements regarding the greater range of IQ's for each age group when obtained by group tests than when obtained by the Binet Tests, that Binet Mental Age equivalents are actual equivalents *for normal children only*. Thus a score of 38 in the Intermediate Examination corresponds to a Binet Mental Age of 12 years when made by a child of approximately 12 years. But if made by a 10-year child, for example, it represents a Binet Mental Age of only 11½ years, since according to the chart a 10-year child making a score of 38 has an IQ of only 115. This lack of constant correspondence between scores and Binet Mental Ages is inherent in all group tests and is due to the lesser accuracy of group tests. This phenomenon seems not to be generally appreciated, as witnessed by the now prevalent custom of converting scores into Binet Mental Age equivalents. There is no Binet Mental Age equivalent of a score in any group test of mental ability which is valid for all ages of individuals. For that reason it is believed that the most scientific method of obtaining IQ's from scores in group tests, which are comparable with Binet IQ's, is by comparison of the variabilities of scores of individuals of the various age groups in the group test and in Binet Tests, as described below.

Mental Age equivalents as such are not necessary to the use of the Higher or Intermediate Examinations. Scores are quite sufficient as measures of mental ability and IQ's as measures of brightness. IQ's can be obtained from scores in the Otis Self-Administering Tests without Mental Age equivalents.

In order to compare scores with Mental Age equivalents of scores in other group tests or to find IQ's comparable with those obtained from other group tests, however, Binet Mental Age equivalents are given to scores in both examinations. These may be obtained from the Interpretation Chart for the Higher Examination. Binet Mental Age equivalents of scores in the Intermediate and Higher Examinations are given also in Tables 2*a* and 2*b*.

TABLE 2*a*

BINET MENTAL AGE EQUIVALENTS OF SCORES IN THE INTERMEDIATE EXAMINATION

SCORE	MA	SCORE	MA	SCORE	MA	SCORE	MA	SCORE	MA
1	7- 4	16	9- 0	31	11- 0	46	13- 1	61	15-11
2	7- 5	17	9- 2	32	11- 2	47	13- 3	62	16- 1
3	7- 6	18	9- 3	33	11- 3	48	13- 5	63	16- 3
4	7- 7	19	9- 5	34	11- 5	49	13- 7	64	16- 6
5	7- 8	20	9- 7	35	11- 6	50	13-10	65	16- 8
6	7- 9	21	9- 8	36	11- 8	51	14- 0	66	16-11
7	7-10	22	9-10	37	11-10	52	14- 2	67	17- 2
8	7-11	23	10- 0	38	12- 0	53	14- 4	68	17- 5
9	8- 0	24	10- 1	39	12- 1	54	14- 6	69	17- 8
10	8- 2	25	10- 3	40	12- 2	55	14- 8	70	17-10
11	8- 4	26	10- 4	41	12- 4	56	14-10	71	18- 0
12	8- 5	27	10- 6	42	12- 6	57	15- 0	72	18- 3
13	8- 7	28	10- 7	43	12- 8	58	15- 2	73	18- 5
14	8- 9	29	10- 9	44	12-10	59	15- 5	74	18- 7
15	8-11	30	10-10	45	12-11	60	15- 8	75	18- 9

TABLE 2*b*

BINET MENTAL AGE EQUIVALENTS OF SCORES IN THE HIGHER EXAMINATION

SCORE	MA	SCORE	MA	SCORE	MA	SCORE	MA	SCORE	MA
1	7-10	16	10- 8	31	13- 5	46	16- 0	61	17-11
2	8- 0	17	10-10	32	13- 7	47	16- 2	62	18- 0
3	8- 2	18	11- 0	33	13-10	48	16- 3	63	18- 2
4	8- 4	19	11- 3	34	14- 0	49	16- 5	64	18- 3
5	8- 6	20	11- 5	35	14- 2	50	16- 6	65	18- 5
6	8- 9	21	11- 7	36	14- 4	51	16- 8	66	18- 6
7	8-11	22	11-10	37	14- 6	52	16- 9	67	18- 8
8	9- 2	23	12- 0	38	14- 8	53	16-10	68	18- 9
9	9- 4	24	12- 2	39	14-10	54	17- 0	69	18-11
10	9- 7	25	12- 4	40	15- 0	55	17- 2	70	19- 0
11	9- 9	26	12- 6	41	15- 2	56	17- 3	71	19- 2
12	10- 0	27	12- 8	42	15- 4	57	17- 5	72	19- 3
13	10- 2	28	12-10	43	15- 6	58	17- 6	73	19- 4
14	10- 4	29	13- 0	44	15- 8	59	17- 8	74	19- 5
15	10- 6	30	13- 3	45	15-10	60	17- 9	75	19- 6

Age norms. The norms in the Intermediate or Higher Examination for the various ages may be read from the appropriate Interpretation Chart by noting the points at which the normal curve cuts the vertical age lines, or may be taken from Table 3 or Table 4.

[1] Here "normal" means exactly median in brightness. The term "normal," however, is often used to refer to all individuals whose scores are reasonably close to the norms for their respective ages.

1. (4)
2. (2)
3. (3)
4. (2)
5. (2)
6. (3)
7. (3)
8. (3)
9. (3)
10. (H)
11. (1)
12. (W)
13. (8)
14. (4)
15. (1)
16. (5)
17. (40)
18. (3)
19. (4)
20. (5)
21. (7)
22. (5)
23. (5)
24. (4)
25. (3)
26. (4)

TABLE 3

AGE NORMS IN INTERMEDIATE EXAMINATION (30-MINUTE TIME LIMIT)

YEARS		8	9	10	11	12	13	14	15	16	17	18 or over
MONTHS	0	7	15	23	31	38	44	49	53	56	58	59
	1	8	16	24	32	39	44	49	53	56	58	
	2	8	16	24	32	39	45	50	53	56	58	
	3	9	17	25	33	40	45	50	54	57	58	
	4	10	18	26	34	40	46	50	54	57	58	
	5	10	18	26	34	41	46	51	54	57	58	
	6	11	19	27	35	41	46	51	55	57	59	
	7	12	20	28	35	42	47	51	55	57	59	
	8	12	20	28	36	42	47	52	55	58	59	
	9	13	21	29	36	43	48	52	55	58	59	
	10	14	22	30	37	43	48	52	56	58	59	
	11	14	22	30	37	43	49	53	56	58	59	

TABLE 4

AGE NORMS IN HIGHER EXAMINATION (30-MINUTE TIME LIMIT)

YEARS		12	13	14	15	16	17	18 or over
MONTHS	0	23	28	32	36	39	41	42
	1	24	28	32	36	39	41	
	2	24	29	33	37	39	41	
	3	25	29	33	37	40	41	
	4	25	29	33	37	40	41	
	5	25	30	34	37	40	41	
	6	26	30	34	38	40	42	
	7	26	30	34	38	40	42	
	8	27	31	35	38	40	42	
	9	27	31	35	38	41	42	
	10	27	31	35	39	41	42	
	11	28	32	36	39	41	42	

Norms for college students. The scores of 2516 college students in the Higher Examination have been reported to date from 21 colleges and universities. Ten of the 21 used 20-minute time limits. Reducing all the scores to a 30-minute basis, the median score of these 2516 students is 53 points. The median scores of the 21 colleges and universities were as follows (30-minute time limit): 37, 39, 45, 46, 51, 51, 52, 53, 53, 54, 55, 55, 56, 56, 57, 59, 61, 62, 62, 64, and 65.

Various percentile scores of the 2516 college students are shown in Table 5.

TABLE 5

SHOWING VARIOUS PERCENTILE SCORES OF 2516 COLLEGE STUDENTS IN THE HIGHER EXAMINATION

	(Lowest)				(Median)				(Highest)
Percentile	0	3	10	25	50	75	90	97	100
20-MINUTE BASIS	16	25	30	36	41	49	55	61	75
30-MINUTE BASIS	20	32	39	40	53	62	67	71	75

Derivation of IQ Scale. According to Dr. Terman,[1] IQ's found by the Stanford Revision of the Binet-Simon Tests are distributed very closely in accordance with the law of normal distribution and with the middle 50 per cent falling within the range of IQ's from 92 to 108.

Due partly, no doubt, to the form of the Intermediate and the Higher Examinations, the steps in difficulty between items being smaller in the first part of each examination than in the last part, the distributions of scores of the several age groups have approximately the same variability, as far as can be determined. These distributions tend to be approximately normal, and are such that the middle 50 per cent of scores of each age group tend to fall within 8 points above and below the norm for that age. Fortunately, therefore, each point in the score of an individual above or below the norm for his age represents a point in IQ above or below 100. If an individual's score exceeds the norm for his age by 12 points, his IQ is 112.

How to find the IQ of an individual. The IQ of an individual may be found in either of two ways. One is as follows: Add to 100 the number of points by which a pupil's score exceeds the norm for his age, or subtract from 100 the number of points by which a pupil's score falls below the norm for his age. A simple and easy way to obtain the same result is to add 100 to the score of the individual and subtract from this sum the score which is the norm for his age. (The norm for individuals over 18 years may be taken as 42 points in the Higher Examination and as 59 points in the Intermediate Examination.) Thus, if a 15-year student's score in the Higher Examination is 34, the norm for his age being 36, his IQ is $34 + 100 - 36 = 98$.

A second method of finding an IQ is to plot the score of the individual in the appropriate Interpretation Chart by placing a dot on the horizontal line representing his score and on the vertical line representing his age. If the dot falls on a curve, the IQ of the individual will be stated at the end of the curve in the IQ column at the right. Thus, if a student of 15 years, 4 months, makes a score of 31 in the Higher Examination, his IQ is 94. If the point falls between two curves, the IQ may be estimated closely enough by noting its position relative to the curve above or below.

The IQ of each student may be entered after his name on the Class Record, in the column headed "IQ."

Index of Brightness. A measure of brightness used in connection with the Otis Group Intelligence Scale is the Index of Brightness. The relation between IQ's obtained by the Higher Examination and the Index of Brightness as found by the Advanced Examination is shown in the IQ and IB columns in the Interpretation Chart. This same correspondence holds good for IQ's obtained by the Intermediate Examination. If IQ's are used, it is not necessary to find IB's. Both IQ's and IB's serve the same purpose.

Percentile Rank. Another measure of brightness is called the "Percentile Rank." If a student exceeds 75 per cent of unselected individuals of his own age in score, he is said to have a Percentile Rank (PR) of 75, and the same for any other per cent. The scale of Percentile Ranks extends, therefore, from 0 to 100. A PR of 50 represents exact normality and corresponds to an IQ or IB of 100.

[1] L. M. Terman, *Measurement of Intelligence* (Houghton Mifflin Company, Boston), page 79.

KEY
Higher
Form A
Page 4
75. (8)
74. (3)
73. (4)
72. (6)
71. (2)
70. (R)
69. (3)
68. (4)
67. (5)
66. (9)
65. (10)
64. (M)
63. (3)
62. (4)
61. (45)
60. (243)
59. (3)
58. (G)
57. (4)
56. (33)
55. (5)
54. (2)
53. (2)
27. (4)
28. (4)
29. (2)
30. (1)
31. (3)
32. (2)
33. (5)
34. (5)
35. (360)
36. (4)
37. (T)
38. (F)
39. (3)
40. (120)
41. (M)
42. (1)
43. (O)
44. (36)
45. (50)
46. (3)
47. 46.
48. (5)
49. (4)
50. (3)
51. (6)
52. (1)

Assuming distributions of scores for the various age groups to be in accord with the law of normal distribution, the Percentile Rank of an individual may be found from his IQ or IB by reference to the PR column at the right of the Interpretation Chart for the Higher Examination. This correspondence holds also between IQ's, IB's, and PR's for the Intermediate Examination. If desired, the student's PR may be entered also on the Class Record. This is optional.

Grade status. Table 6 shows the grade status corresponding to various 30-minute scores in the Intermediate and Higher Examinations. For example, a score of 11 in the Intermediate Examination is a grade status of 3.5 — that is, it is the norm for the end of the fifth month of the third grade; a score of 30 in the Higher Examination is the norm for the beginning of the eighth grade. These values are based on the tables of norms and Table 31 of *Statistical Method in Educational Measurement* (World Book Company).

Tables 7, 8, and 9 show the distributions of scores in the Intermediate and the Higher Examinations. Similar data have been compiled for the other grades but cannot be given for lack of space.

TABLE 6

Intermediate Examination						Higher Exam.	
Score	Grade Status	Score	Grade Status	Score	Grade Status	Score	Grade Status
11	3.5	26	5.0	41	7.0	30	8.0
12	3.6	27	5.1	42	7.2	31	8.2
13	3.7	28	5.2	43	7.3	32	8.5
14	3.8	29	5.3	44	7.5	33	8.7
15	3.9	30	5.5	45	7.6	34	9.0
16	4.0	31	5.6	46	7.8	35	9.4
17	4.1	32	5.7	47	7.9	36	9.8
18	4.2	33	5.8	48	8.1	37	10.0
19	4.3	34	6.0	49	8.3	38	10.4
20	4.4	35	6.1	50	8.5	39	10.8
21	4.5	36	6.3	51	8.7	40	11.0
22	4.6	37	6.4	52	9.0	41	11.6
23	4.7	38	6.6	53	9.2	42	12.0
24	4.8	39	6.7	54	9.5	43	12.6
25	4.9	40	6.9	55	9.8		

TABLE 8

Showing Distribution of Scores of 35,278 Pupils in the 8th Grade in the Intermediate Examination

Score	Age 11 to 11–11	12 to 12–11	13 to 13–11	14 to 14–11	15 to 15–11	16 to 16–11	17 to 17–11	18 or over	Totals
75		1	3	6	1				11
70–74	14	96	303	182	48	9			652
65–69	28	324	1177	740	213	50	4		2536
60–64	53	227	1710	1327	432	93	10		3852
55–59	39	426	1828	1753	732	168	16	2	4964
50–54	44	441	1771	1933	1025	219	42	2	5477
45–49	22	313	1468	1822	1102	295	54	2	5088
40–44	28	253	1187	1567	1052	313	38	6	4444
35–39	26	197	790	1122	849	268	50	10	3312
30–34	16	139	513	820	605	237	28	6	2364
25–29	9	76	244	393	423	160	28	2	1335
20–24	9	38	146	242	221	106	28	10	800
15–19	1	17	60	102	63	50	4		297
10–14		7	12	33	28	13	4		97
5–9	2	1	10	5	7	4			29
0–4			2	6	9	3			20
Totals	301	2556	11224	12053	6810	1988	306	40	35278

Median age: 14 yr. 3 mo. Median score: 49.

TABLE 7

Showing Distribution of Scores of 24,724 Pupils in the 6th Grade in the Intermediate Examination

Score	Age 9 to 9–11	10 to 10–11	11 to 11–11	12 to 12–11	13 to 13–11	14 to 14–11	15 to 15–11	16 or over	Totals
75			1						1
70–74		3	19	8					30
65–69		31	116	49	10	6			212
60–64	1	66	344	193	28	2	3		637
55–59	3	97	551	336	87	24	5	1	1104
50–54	3	142	912	586	197	79	21		1940
45–49	7	183	1130	1084	340	138	34	7	2923
40–44	6	162	1193	1061	491	208	50	11	3182
35–39	6	207	1221	1241	668	280	106	11	3740
30–34	9	155	1003	1180	761	338	150	24	3620
25–29	7	115	784	935	700	360	171	27	3099
20–24		83	457	612	556	328	179	8	2223
15–19	1	34	241	341	353	220	117	26	1333
10–14	1	7	75	134	150	89	58	14	528
5–9		2	11	27	25	31	23	6	125
0–4			6	7	4	4	4	2	27
Totals	44	1287	8064	7794	4370	2107	921	137	24724

Median age: 12 yr. 5 mo. Median score: 41.

TABLE 9

Showing Distribution of Scores of 15,715 Pupils in the 12th Grade in the Higher Examination

Score	Age 14 to 14–11	15 to 15–11	16 to 16–11	17 to 17–11	18 to 18–11	19 to 19–11	20 or over	Totals
75	1		1					2
70–74		5	19	11	5	2	1	43
65–69	2	31	78	128	43	10	4	296
60–64	4	40	283	312	123	31	11	804
55–59	3	75	465	454	227	62	23	1309
50–54	10	125	628	970	484	147	52	2416
45–49	7	96	770	1247	462	219	76	2877
40–44	4	78	532	1280	750	227	92	2963
35–39		40	415	960	686	268	101	2470
30–34	1	28	211	495	455	172	66	1428
25–29		10	85	213	216	112	43	679
20–24		1	27	85	97	60	17	287
15–19		5	11	31	27	18	5	97
10–14			4	10	5	3	5	27
5–9				5	4	4		13
0–4				1	1	2		4
Totals	32	394	3529	6202	3585	1337	496	15715

Median age: 17 yr. 7 mo. Median score: 44.

1. (3)
2. (30)
3. (4)
4. (2)
5. (1)
6. (2)
7. (14)
8. (4)
9. (3)
10. (2)
11. (5)
12. (6)
13. (3)
14. (1)
15. (240)
16. (4)
17. (1)
18. (4)
19. (5)
20. (4)
21. (8)
22. (2)
23. (2)
24. (5)
25. (2)
26. (2)

Application of Results

Purposes of mental-ability tests. The chief administrative purposes for which mental-ability tests are given are: (1) the division of the pupils of a grade or the students of a class into more homogeneous divisions, usually in order that instruction of different degrees of enrichment may be given, (2) the regrading of pupils so that the pupils of each grade are more homogeneous in mental ability and are therefore more easily taught together, (3) the division of pupils of a school into groups which will progress at different rates.

The reader should consult *Intelligence Tests and School Reorganization*, by L. M. Terman and others (World Book Company), for a detailed discussion of the purposes and uses of tests of mental ability in regrading and classifying.

Division of classes. If it is desired to divide the students of a class into more homogeneous groups for instruction purposes, this may be done either on the basis of score or on the basis of IQ. Division on the basis of score would be made as follows:

Classification according to score. Find the distribution of the scores of the class. If the scores are plotted on the Interpretation Chart, this may be done by placing in the column under "Totals" at the left the number of dots on each horizontal line. (If desired, the frequencies of the various class intervals, 0–4, 5–9, etc., may be entered in the same column. These will be used in drawing a percentile curve on the Percentile Graph.) By means of this distribution the class may be divided into any number of divisions for differentiated instruction. Thus, let us suppose it is desired to divide a class into three divisions, A, B, and C, on the basis of score. This would be done as follows: Count down the distribution until one third the total number of scores has been counted. At this point draw a line across the distribution to mark the lower limit of score of Group A. Next count down another third and draw another line marking off Group B from Group C. Referring now to the Class Record, where each student's score appears opposite his name, the division designation, A, B, or C, may be placed opposite each student's name in the column headed "Classification."

This method is illustrated in the sample Interpretation Chart in Figure 2. Here 105 9th-year students are divided into three classes of 35 students each on the basis of score.

Classification according to brightness. If it is desired to divide the students of a class into divisions on the basis of brightness, this may be done by dividing the distribution of IQ's in the same way as suggested above for dividing the distribution of scores. To find the distribution of IQ's, count the dots between each two adjacent curves, including those which touch the lower but not the upper curve. Place the number of dots in the column headed "Totals" at the right, as shown in the sample charts. As a check on accuracy in counting the dots, it will be well to add these numbers and see that the sum corresponds to the number of students in the class.

Considerations governing method of classification. Two methods of classification have been described. Which should be used? It will be found that the dispersion of scores of any age group is so great in comparison with the rather narrow range of age norms for high school ages, that the resulting classifications by the two methods are very nearly the same. Even when classified by IQ, the superior division consists of students whose scores are nearly all higher than those of the next division, etc. It remains for further research to discover which is the better method. It is possible that if the classification is made for the purpose of determining groups which will cover the curriculum of the high school in different amounts of time, classification on the basis of IQ may be the better method, whereas if it is to establish sections which will take work of differing degrees of intensity, classification on the basis of score may be the better.

Regrading. If it is felt that the pupils of a school are very badly graded, so that the 6th grade, for example, is believed to contain some pupils who could do satisfactory work in the 7th or 8th grade and some who should be in the 5th grade to do the best work, the pupils may be regraded on the basis of score in a mental-ability test. The ideal grading would be that in which the pupils of the 6th grade all make scores higher than those in the 5th grade and lower than those in the 7th grade, etc. Practically this is impossible.

The next best procedure is to select those pupils from the 6th grade who make very high or very low scores and to promote or demote these. No hard and fast rule can be laid down for this. The number of pupils to be shifted depends partly on the amount of overlapping of ability between grades and partly on the character of the instruction possible in the school. Where relatively individual instruction is possible, homogeneous grouping is not so essential. It is probably best to begin regrouping slowly, taking first those whose scores deviate most from the median score of the grade and whose scholarship in the judgment of the teacher accords with their scores, and promoting or demoting these pupils one grade or one-half grade. If conditions warrant or seem to require it, they may be further promoted or demoted later. Later, also, more pupils may be regraded, until by degrees the grades will become more nearly homogeneous.

Multiple-track plan. A plan of school organization called the "multiple-track plan," in use in Oakland, California, and elsewhere, is one in which the pupils of the school are divided into groups (generally three, sometimes five) which progress at different rates. Thus there may be fast-moving, normal, and slow-moving classes, covering the first eight grades in say 7, 8, and 9 years, respectively.

A situation illustrating the need of reclassification is that shown in the sample Interpretation Chart in Figure 1. In this chart are plotted the scores of 276 pupils in Grades 5 to 8 of a grammar school. The scores of the different grades are plotted by different marks. It will be seen that the different grades overlap very markedly. Each grade contains both young pupils making high scores, who are therefore very bright, and old pupils making low scores, who are therefore very dull.

Division of pupils into groups to progress at different rates should be made on the basis of brightness. It is recommended by Terman that the brightest 15 per cent of the pupils of a school be placed in fast-moving classes (where numbers permit) and the dullest 15 per cent in slow-moving classes. The selection of these pupils should be made, therefore, on the basis of IQ (or IB or PR). A convenient method of making the division is illustrated in Figure 1 in the case of the 276 pupils. Of this number 15 per cent is about 40. Therefore the brightest 40 (according to IQ) should be placed in the fast-moving group and the dullest 40 in the slow-moving group.

The method of making the division by means of the chart

KEY
Higher
Form B
Page 4

EXAMINATION BEGINS HERE:

1. The opposite of hate is (?)
   1 enemy, 2 fear, 3 love, 4 friend, 5 joy ..... ( )
2. If 3 pencils cost 5 cents, how many pencils can be bought for 50 cents? ..... ( )
3. A bird does not always have (?)
   1 wings, 2 eyes, 3 feet, 4 a nest, 5 a bill ..... ( )
4. The opposite of honor is (?)
   1 glory, 2 disgrace, 3 cowardice, 4 fear, 5 defeat ..... ( )
5. A fox most resembles a (?)
   1 wolf, 2 goat, 3 pig, 4 tiger, 5 cat ..... ( )
6. Quiet is related to sound in the same way that darkness is related to (?)
   1 a cellar, 2 sunlight, 3 noise, 4 stillness, 5 loud ..... ( )
7. A party consisted of a man and his wife, his two sons and their wives, and four children in each son's family. How many were there in the party? ..... ( )
8. A tree always has (?)
   1 leaves, 2 fruit, 3 buds, 4 roots, 5 a shadow ..... ( )
9. The opposite of economical is (?)
   1 cheap, 2 stingy, 3 extravagant, 4 value, 5 rich ..... ( )
10. Silver is more costly than iron because it is (?)
    1 heavier, 2 scarcer, 3 whiter, 4 harder, 5 prettier ..... ( )
11. Which one of the six statements below tells the meaning of the following proverb? "The early bird catches the worm." ..... ( )

    1. Don't do the impossible.
    2. Weeping is bad for the eyes.
    3. Don't worry over troubles before they come.
    4. Early birds like worms best.
    5. Prompt persons often secure advantages over tardy ones.
    6. It is foolish to fret about things we can't help.

12. Which statement above tells the meaning of this proverb? "Don't cry over spilt milk." .... ( )
13. Which statement above explains this proverb? "Don't cross a bridge till you get to it." .... ( )
14. An electric light is related to a candle as an automobile is to (?)
    1 a carriage, 2 electricity, 3 a tire, 4 speed, 5 glow ..... ( )
15. If a boy can run at the rate of 6 feet in $\frac{1}{4}$ of a second, how many feet can he run in 10 seconds? ( )
16. A meal always involves (?)
    1 a table, 2 dishes, 3 hunger, 4 food, 5 water ..... ( )
17. Of the five words below, four are alike in a certain way. Which is the one not like these four?
    1 bend, 2 shave, 3 chop, 4 whittle, 5 shear ..... ( )
18. The opposite of never is (?)
    1 often, 2 sometimes, 3 occasionally, 4 always, 5 frequently ..... ( )
19. A clock is related to time as a thermometer is to (?)
    1 a watch, 2 warm, 3 a bulb, 4 mercury, 5 temperature ..... ( )
20. Which word makes the truest sentence? Men are (?) shorter than their wives.
    1 always, 2 usually, 3 much, 4 rarely, 5 never ..... ( )
21. One number is wrong in the following series. What should that number be?
    1 4 2 5 3 6 4 7 5 9 6 9 ..... ( )
22. If the first two statements following are true, the third is (?) All members of this club are Republicans. Smith is not a Republican. Smith is a member of this club.
    1 true, 2 false, 3 not certain ..... ( )
23. A contest always has (?)
    1 an umpire, 2 opponents, 3 spectators, 4 applause, 5 victory ..... ( )
24. Which number in this series appears a second time nearest the beginning?
    6 4 5 3 7 8 0 9 5 9 8 8 6 5 4 7 3 0 8 9 1 ..... ( )
25. The moon is related to the earth as the earth is to (?)
    1 Mars, 2 the sun, 3 clouds, 4 stars, 5 the universe ..... ( )
26. Which word makes the truest sentence? Fathers are (?) wiser than their sons.
    1 always, 2 usually, 3 much, 4 rarely, 5 never ..... ( )

OTIS SELF-ADMINISTERING TESTS OF MENTAL ABILITY

By ARTHUR S. OTIS

Formerly Development Specialist with Advisory Board, General Staff, United States War Department

HIGHER EXAMINATION: FORM A

20 **For High Schools and Colleges** Score.....

Read this page. Do what it tells you to do.

Do not open this paper, or turn it over, until you are told to do so. Fill these blanks, giving your name, age, birthday, etc. Write plainly.

Name..... Age last birthday..... years
First name, initial, and last name

Birthday..... Class..... Date..... 192...
Month Day

School or College..... City.....

This is a test to see how well you can think. It contains questions of different kinds. Here is a sample question already answered correctly. Notice how the question is answered:

Which one of the five words below tells what an apple is?
1 flower, 2 tree, 3 vegetable, 4 fruit, 5 animal.....(*4*)

The right answer, of course, is "fruit"; so the word "fruit" is underlined. And the word "fruit" is No. 4; so a figure 4 is placed in the parentheses at the end of the dotted line. This is the way you are to answer the questions.

Try this sample question yourself. Do not write the answer; just draw a line under it and then put its number in the parentheses:

Which one of the five words below means the opposite of north?
1 pole, 2 equator, 3 south, 4 east, 5 west.....( )

The answer, of course, is "south"; so you should have drawn a line under the word "south" and put a figure 3 in the parentheses. Try this one:

A foot is to a man and a paw is to a cat the same as a hoof is to a — what?
1 dog, 2 horse, 3 shoe, 4 blacksmith, 5 saddle.....( )

The answer, of course, is "horse"; so you should have drawn a line under the word "horse" and put a figure 2 in the parentheses. Try this one:

At four cents each, how many cents will 6 pencils cost?.....( )

The answer, of course, is 24, and there is nothing to underline; so just put the 24 in the parentheses. If the answer to any question is a number or a letter, put the number or letter in the parentheses without underlining anything. Make all letters like printed capitals.

The test contains 75 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed half an hour after the examiner tells you to begin. Try to get as many right as possible. Be careful not to go so fast that you make mistakes. Do not spend too much time on any one question. No questions about the test will be answered by the examiner after the test begins. Lay your pencil down.

Do not turn this page until you are told to begin.

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27. The opposite of awkward is (?)
1 strong, 2 pretty, 3 short, 4 graceful, 5 swift..... ( )

28. A mother is always (?) than her daughter.
1 wiser, 2 taller, 3 stouter, 4 older, 5 more wrinkled..... ( )

29. Which one of the six statements below tells the meaning of the following proverb? "The burnt child dreads the fire."..... ( )

1. Frivolity flourishes when authority is absent.
2. Unhappy experiences teach us to be careful.
3. A thing must be tried before we know its value.
4. A meal is judged by the dessert.
5. Small animals never play in the presence of large ones.
6. Children suffer more from heat than grown people.

30. Which statement above explains this proverb? "When the cat is away, the mice will play." ( )

31. Which statement above explains this proverb? "The proof of the pudding is in the eating." ( )

32. If the settlement of a difference is made by mutual concession, it is called a (?)
1 promise, 2 compromise, 3 injunction, 4 coercion, 5 restoration..... ( )

33. What is related to disease as carefulness is to accident?
1 doctor, 2 surgery, 3 medicine, 4 hospital, 5 sanitation..... ( )

34. Of the five things below, four are alike in a certain way. Which is the one not like these four?
1 smuggle, 2 steal, 3 bribe, 4 cheat, 5 sell..... ( )

35. If 10 boxes full of apples weigh 400 pounds, and each box when empty weighs 4 pounds, how many pounds do all the apples weigh?..... ( )

36. The opposite of hope is (?)
1 faith, 2 misery, 3 sorrow, 4 despair, 5 hate..... ( )

37. If all the odd-numbered letters in the alphabet were crossed out, what would be the tenth letter not crossed out? Print it. *Do not mark the alphabet.*
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z..... ( )

38. What letter in the word SUPERFLUOUS is the same number in the word (counting from the beginning) as it is in the alphabet? Print it..... ( )

39. What people say about a person constitutes his (?)
1 character, 2 gossip, 3 reputation, 4 disposition, 5 personality..... ( )

40. If $2\frac{1}{2}$ yards of cloth cost 30 cents, how many cents will 10 yards cost?..... ( )

41. If the words below were arranged to make a good sentence, with what letter would the second word of the sentence begin? Make it like a printed capital.
same means big large the as..... ( )

42. If the first two statements following are true, the third is (?) George is older than Frank. James is older than George. Frank is younger than James.
1 true, 2 false, 3 not certain..... ( )

43. Suppose the first and second letters in the word CONSTITUTIONAL were interchanged, also the third and fourth letters, the fifth and sixth, etc. Print the letter that would then be the twelfth letter counting to the right..... ( )

44. One number is wrong in the following series. What should that number be?
0 1 3 6 10 15 21 28 34..... ( )

45. If $4\frac{1}{2}$ yards of cloth cost 90 cents, how many cents will $2\frac{1}{2}$ yards cost?..... ( )

46. A man's influence in a community should depend upon his (?)
1 wealth, 2 dignity, 3 wisdom, 4 ambition, 5 political power..... ( )

47. What is related to few as ordinary is to exceptional?
1 none, 2 some, 3 many, 4 less, 5 more..... ( )

48. The opposite of treacherous is (?)
1 friendly, 2 brave, 3 wise, 4 cowardly, 5 loyal..... ( )

49. Which one of the five words below is most unlike the other four?
1 good, 2 large, 3 red, 4 walk, 5 thick..... ( )

50. If the first two statements following are true, the third is (?) Some of Brown's friends are Baptists. Some of Brown's friends are dentists. Some of Brown's friends are Baptist dentists.
1 true, 2 false, 3 not certain..... ( )

51. How many of the following words can be made from the letters in the word LARGEST, using any letter any number of times?
great, stagger, grasses, trestle, struggle, rattle, garage, strangle..... ( )

52. The statement that the moon is made of green cheese is (?)
1 absurd, 2 misleading, 3 improbable, 4 unfair, 5 wicked..... ( )

 Do not stop. Go on with the next page.

53. Of the five things following, four are alike in a certain way. Which is the one not like these four?
1 tar, 2 snow, 3 soot, 4 ebony, 5 coal ( )

54. What is related to a cube in the same way in which a circle is related to a square?
1 circumference, 2 sphere, 3 corners, 4 solid, 5 thickness ( )

55. If the following words were seen on a wall by looking in a mirror on an opposite wall, which word would appear exactly the same as if seen directly?
1 OHIO, 2 SAW, 3 NOON, 4 MOTOR, 5 OTTO ( )

56. If a strip of cloth 24 inches long will shrink to 22 inches when washed, how many inches long will a 36-inch strip be after shrinking? ( )

57. Which of the following is a trait of character?
1 personality, 2 esteem, 3 love, 4 generosity, 5 health ( )

58. Find the two letters in the word DOING which have just as many letters between them in the word as in the alphabet. Print the one of these letters that comes first in the alphabet.
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z ( )

59. Revolution is related to evolution as flying is to (?)
1 birds, 2 whirling, 3 walking, 4 wings, 5 standing ( )

60. One number is wrong in the following series. What should that number be?
1 3 9 27 81 108 ( )

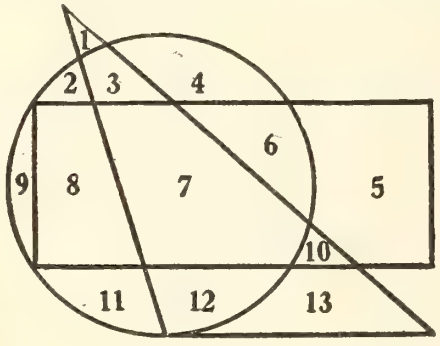
61. If Frank can ride a bicycle 30 feet while George runs 20 feet, how many feet can Frank ride while George runs 30 feet? ( )

62. Count each N in this series that is followed by an O next to it if the O is not followed by a T next to it. Tell how many N's you count.
N O N T Q M N O T M O N O O N Q M N N O Q N O T O N A M O N O M ( )

63. A man who is averse to change and progress is said to be (?)
1 democratic, 2 radical, 3 conservative, 4 anarchistic, 5 liberal ( )

64. Print the letter which is the fourth letter to the left of the letter which is midway between O and S in the alphabet ( )

65. What number is in the space which is in the rectangle and in the triangle but not in the circle? ( )



66. What number is in the same geometrical figure or figures as the number 8? ( )

67. How many spaces are there that are in any two but only two geometrical figures? ( )

68. A surface is related to a line as a line is to (?)
1 solid, 2 plane, 3 curve, 4 point, 5 string ( )

69. If the first two statements following are true, the third is (?) One cannot become a good violinist without much practice. Charles practices much on the violin. Charles will become a good violinist.
1 true, 2 false, 3 not certain ( )

70. If the words below were arranged to make the best sentence, with what letter would the last word of the sentence end? Print the letter as a capital.
sincerity traits courtesy character of desirable , and are ( )

71. A man who is influenced in making a decision by preconceived opinions is said to be (?)
1 influential, 2 prejudiced, 3 hypocritical, 4 decisive, 5 impartial ( )

72. A hotel serves a mixture of 2 parts cream and 3 parts milk. How many pints of cream will it take to make 15 pints of the mixture? ( )

73. What is related to blood as physics is to motion?
1 temperature, 2 veins, 3 body, 4 physiology, 5 geography ( )

74. A statement the meaning of which is not definite is said to be (?)
1 erroneous, 2 doubtful, 3 ambiguous, 4 distorted, 5 hypothetical ( )

75. If a wire 20 inches long is to be cut so that one piece is $\frac{2}{3}$ as long as the other piece, how many inches long must the shorter piece be? ( )

• ○ × △ INTERPRETATION CHART. For Intermediate Examination

Grades plotted 5th, 6th, 7th and 8th Number 276 Form used A Time limit 30 min. Date Oct. 1 1922

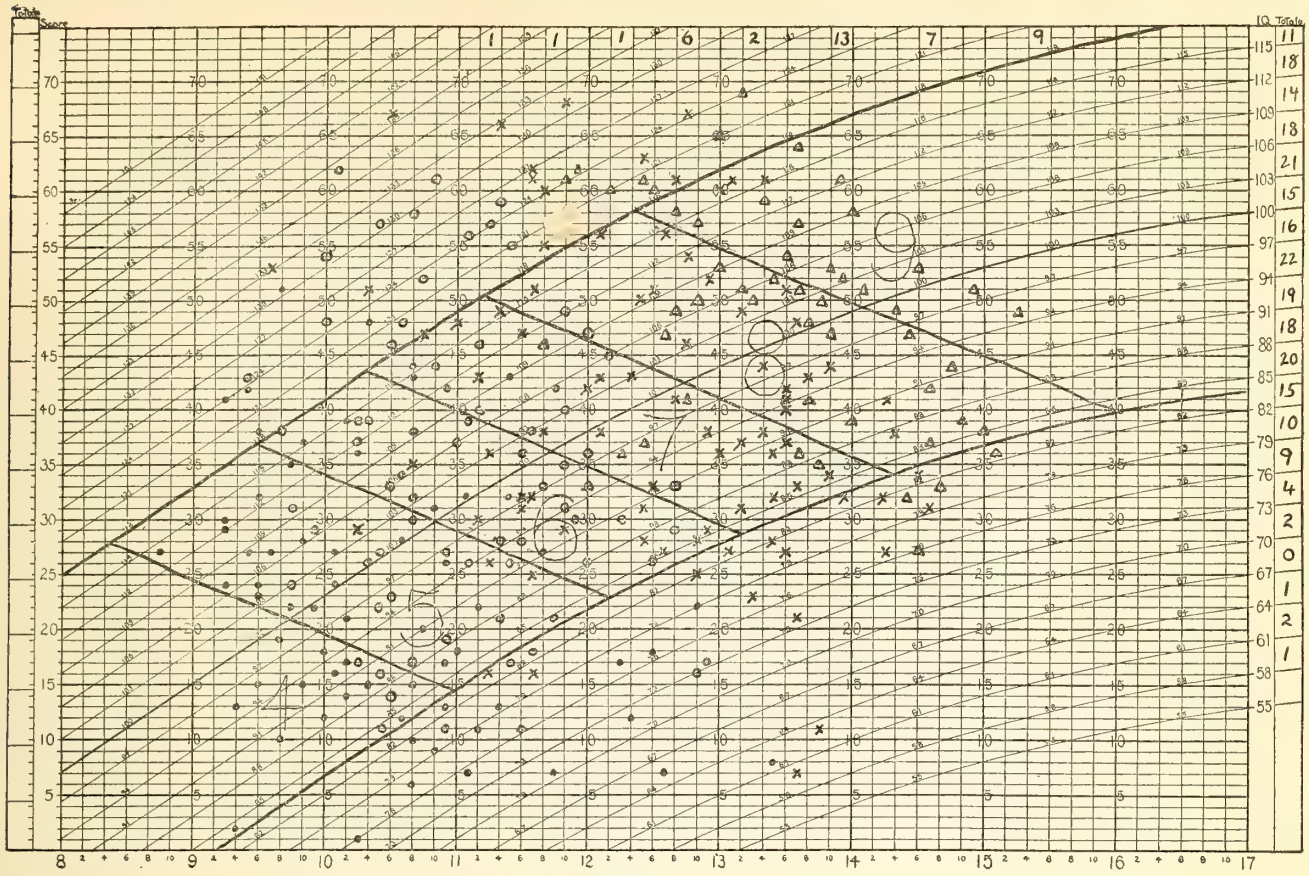


FIG. 1

INTERPRETATION CHART. For Higher Examination

Classes plotted Ninth Year Number 105 Form used A Time limit 30 min. Date Oct. 1 1922

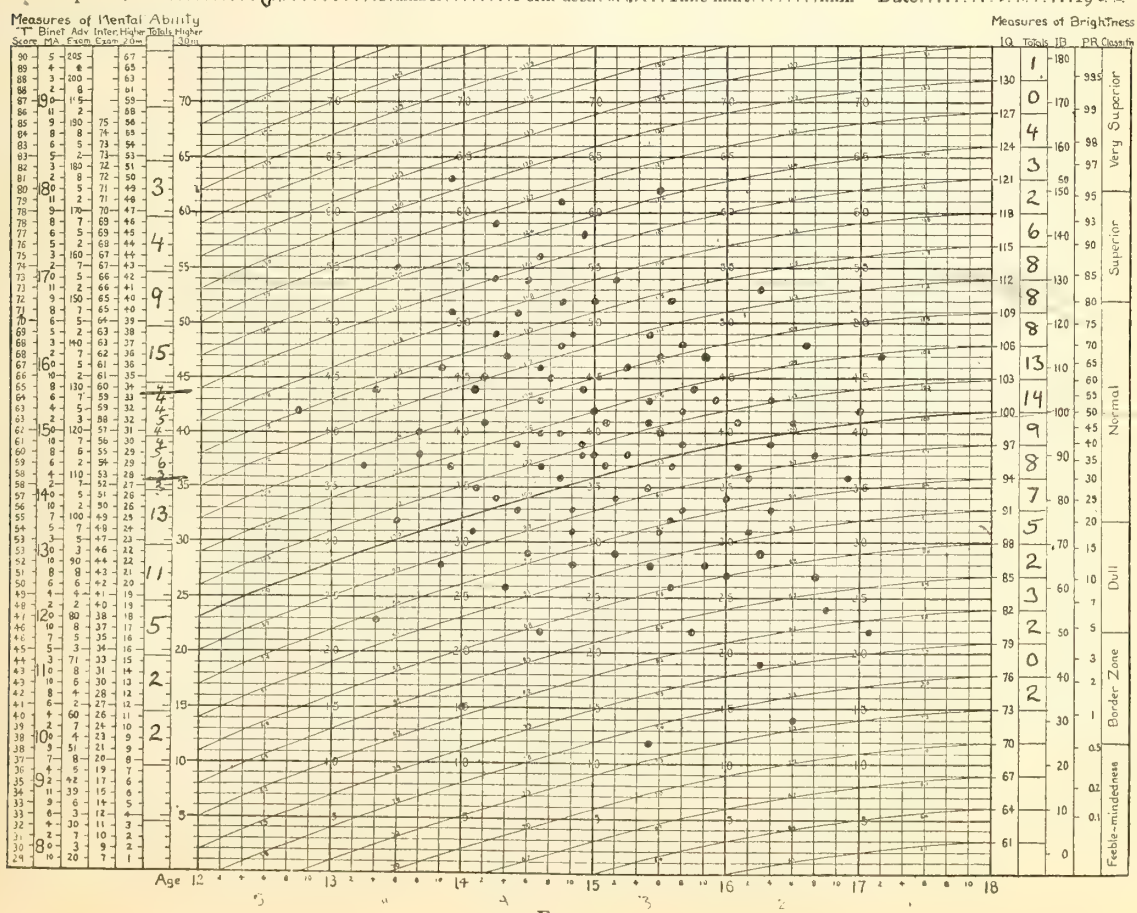


FIG. 2

KEY

Higher Form B

Page 2

1. (3)
2. (20)
3. (3)
4. (G)
5. (T)
6. (2)
7. (2)
8. (2)
9. (450)
10. (4)
11. (4)
12. (6)
13. (5)
14. (3)
15. (3)
16. (4)
17. (3)
18. (8)
19. (3)
20. (17)
21. (4)
22. (1)
23. (2)
24. (2)
25. (5)

is as follows: Find the curve which separates the upper 40 cases according to IQ. If no curve cuts off approximately 40 cases, draw a curve which does, making it parallel to the printed curves. The pupils whose scores are plotted above this curve should be placed in the fast-moving class. Similarly find or draw a curve which separates the lower 40 cases according to IQ. The pupils whose scores are plotted below this curve should be placed in the slow-moving group.

Grading within the group. The pupils of the three groups, fast-moving, normal, and slow-moving, are still to be graded. Ideally this would be done on the basis of score. Thus, if the 196 pupils in the normal group are to be placed in Grades 5, 6, 7, and 8, the lowest fourth or 49, according to score, would be placed in the 5th grade, the next 49, according to score, would be placed in the 6th grade, etc.

This would result, however, in placing in one grade pupils who, although very homogeneous as to score, had a very wide range of ages. The pupils of the 6th grade, for example, according to this plan, might range in age from a little over 9 years to nearly 16 years. Practically, therefore, it may seem more desirable to take some account of the age of the child. A very simple way to do this is by drawing lines across the middle band of the chart at a slight slant instead of horizontally, as shown in Figure 1; in this way age is automatically taken account of. The pupils represented by the dots in each area so marked out, while somewhat less homogeneous as to score, are much more homogeneous as to age. The greater the slant, the more weight is given to age.

In the sample chart provision is made for skipping certain pupils into the 9th grade, demoting others into the 4th grade, and dividing the remaining pupils into four groups of 40 each which would be placed in the 5th, 6th, 7th, and 8th grades.

If the slanting-line method is used, the dots plotted in the Interpretation Chart must be identified, or else it will be necessary to plot the score of each pupil again to determine in what grade he should be. It has been found feasible to do this by numbering the pupils consecutively on the Class Record and writing each pupil's number in small figures near the dot representing his score. If this is done, the pupils whose scores fall within a given area may be identified at once.

The number of cases represented in the sample chart is too small to illustrate the division of the fast- and slow-moving groups into grades — and, indeed, in a school of this size the establishment of fast- and slow-moving classes would doubtless entail grave administrative difficulties; but in a school where there are many more pupils, this would be done in exactly the same way as shown in the case of the normal group.

It must be remembered that the classification which would be effected by any of the above methods is rather in the nature of a goal to be worked toward gradually. It is doubtful whether it would ever be wise to reorganize a school completely on any of these plans at one time, especially on the basis of one test. It would be better, doubtless, to promote or demote extreme cases, as explained above, and as these show themselves to be properly placed others may be shifted. The teachers' independent judgments should weigh equally with the test results in determining which pupils should be regraded or in what grade any individual pupil should be placed. Indeed, the regrading should be done according to the judgment of the teachers *in the light of the test results.*

Educational and vocational guidance. In advising a young high school student regarding his educational future or his vocation, his degree of brightness should be considered. It seems probable that an entering student with a PR of 90 or higher may safely be permitted to attempt to finish high school in $3\frac{1}{2}$ or even 3 years. A student with a PR of 50 or less should certainly be prevented from attempting more than the regular course. Any one interested in research will do well to investigate the degree of brightness necessary to complete successfully the high school in $3\frac{1}{2}$ or 3 years.

A boy or girl having a PR of 75 or over may be safely encouraged to go to college. Doubtless many whose PR's are between 50 and 75 will succeed in college if industrious. A boy or girl whose PR is less than 25 probably should be dissuaded from going to college. Here again there is need of research.

Similarly the degree of brightness of a student should be considered in advising him regarding a vocation. Bright students should be encouraged to enter the professions. Dull ones should be helped to choose a trade. The Stenquist Mechanical Aptitude Tests[1] may help to discover the proper trend of a boy's education.

Classification Test. If it is desired to give a general achievement test in any grade from the fourth to the ninth in addition to the Intermediate Examination, it is recommended that the Classification Test[1] be used. The Classification Test is a combination of the Intermediate Examination and a general achievement test covering reading, arithmetic, spelling, grammar and diction, geography, history and civics, literature, vocabulary, physiology and hygiene, and general information, including music and art. Form A of the Classification Test contains Form A of the Intermediate Examination, and Form B of the Classification Test contains Form B of the Intermediate Examination. The time limit on each of the two parts is one-half hour. The correlation of the Classification Test and the Stanford Achievement Test was found by Dr. E. E. Keener to be .83.

The Percentile Graph

In order to compare the score of any pupil with the scores of the class as a whole or to compare two or more classes, the most effective way is to draw a percentile curve for each grade or class on the Percentile Graph, a copy of which is included in each package of Examinations.

Definition of percentile curve. A percentile curve is a smooth line having a horizontal length representing 100 per cent of the scores of any group of individuals and so drawn that any point on the curve has a height representing the amount of a given score and a horizontal position on the graph representing the per cent of the scores of the group that is exceeded by the given score. The method of drawing a percentile curve is given in full below. One not familiar with percentile curves will appreciate their significance after studying the directions for drawing them.

A percentile curve shows at a glance not only the median score of a class but also the range and variability of the scores. It shows at a glance just what per cent of the scores of the class is exceeded by the score of any given individual and just what per cent of the class attains or exceeds any given score. Two or

[1] Published by World Book Company, Yonkers-on-Hudson, New York.

KEY
Higher
Form C
Page 4

more curves on the same graph show very vividly the amount of overlapping of the scores of different classes.

Directions for Drawing a Percentile Curve

General procedure. The steps taken in drawing the percentile curve are: (1) distributing the scores, (2) finding the subtotals — number of cases to and including those in each class interval, (3) reducing these subtotals to per cents of the number of cases in the group, (4) locating points in the graph representing these per cents, and (5) drawing a smooth curve through these points.

Provision is made for distributing the scores of two groups of individuals on one Percentile Graph sheet, and from these distributions two percentile curves may be drawn. This does not mean, however, that only two curves may be drawn on one graph. The scores of additional groups may be distributed on other Percentile Graph sheets or any sheet of paper and as many curves drawn on one graph as may be conveniently distinguished.

Distributing the scores. In one of the columns headed "Tallying," distribute the scores of a class by putting a short mark opposite the interval of score within which the score of each individual falls. The sample Percentile Graph (Fig. 3) shows that in the freshman class two individuals had scores between 60 and 64, two had scores between 55 and 59, five had scores between 50 and 54, etc. If the scores of a class have been plotted on an Interpretation Chart, the number of scores falling within each interval of score may be copied directly on to the Percentile Graph sheet in figures, as shown in the sample in the case of the sophomore class. This will save distributing the scores again. The number of tallies or the figure in the Tallying column which tells the number of scores falling within any given interval of scores is called a "frequency." The frequency of freshman scores between 45 and 49, for example, is 8.

Finding the subtotals. Begin at the bottom of the column of frequencies and place in the square to the right of each frequency the sum of the frequencies up to and including those in that group. In the "Subtotal" column, under "Freshman," there is 1 score in the first interval, a subtotal of 2 to and including the second interval, a subtotal of 4 to and including the third interval, etc., and 50 to and including the last interval. This last "subtotal" (50) should equal the number of students in the class, as entered at the top of the column.

Reducing subtotals to per cents. In the column headed "Per cents," write opposite each subtotal the per cent that subtotal is of the whole number of students in the class. In the sample, under Freshman, 1 is 2 per cent of 50, 2 is 4 per cent of 50, 4 is 9 per cent of 50, etc., and 50 is 100 per cent of 50.

It is not necessary to reduce subtotals to per cents when use is made of the Scale Chart printed on the back of the Percentile Graph. The manner of using the Scale Chart is given below.

Locating points in the graph. First place a dot at the left edge of the graph on the horizontal line representing the lower limit of the lowest class interval containing a score. Next, place on the next line above, a dot having a distance to the right of the left margin of the graph equal to the first number in the per cents column, according to the scale at the foot of the graph. (In the sample the second dot in the percentile curve for the freshmen is placed 2 units from the edge of the graph.) Next, place on the next line above, a dot having a distance to the right of the margin representing the next per cent, etc. (The third dot represents 4 per cent, etc., and the last dot represents 100 per cent.)

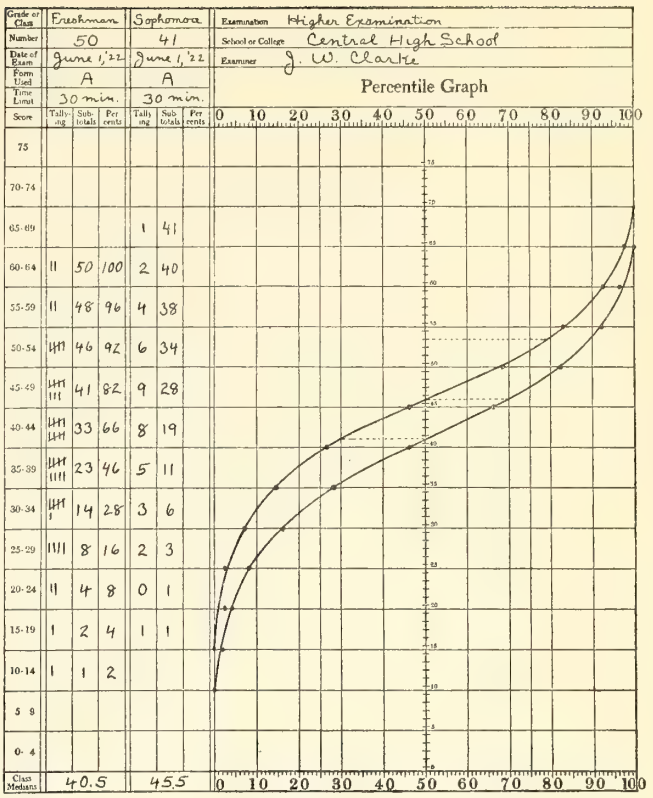


Fig. 3

Use of Scale Chart. The Scale Chart on the back of the Percentile Graph is provided to simplify the process of plotting the points in the graph. It is used as follows: Let us take the case of the freshman class, there being 50 students in the class. Find Scale 50 on the Scale Chart according to the numbers at the right. This line is divided into exactly 50 equal parts by the slanting lines in the chart. Each space, therefore, represents $\frac{1}{50}$ or 2 per cent of the width of the graph. The second dot in the freshman percentile curve is to be placed just $\frac{1}{50}$ of the distance to the right of the margin. This is just 1 space on Scale 50. The third dot is to be placed just 2 spaces to the right of the margin, the fourth point just 4 spaces to the right of the margin, etc., according to Scale 50 in the Scale Chart. By the use of Scale 41 the points have been plotted in the same way for the sophomore class.

By folding the Scale Chart on the proper scale and applying it to the Percentile Graph,[1] the width of the graph may be divided into any number of equal parts from 40 to 100. By letting 2 or 4 graduations represent 1 unit or letting 1 graduation represent 2 units, the width of the graph may be divided into any number of equal parts from 10 to 200.

Drawing the curve. Draw a smooth curve through the dots plotted as described above. This is the percentile curve.

Finding median score of class. The point where the percentile curve cuts the 50-percentile line represents the median

[1] If only one Percentile Graph is at hand, the proper distances may be transferred from the Scale Chart on the back by means of a strip of paper.

1. (3)
2. (15)
3. (4)
4. (2)
5. (3)
6. (1)
7. (14)
8. (2)
9. (5)
10. (2)
11. (3)
12. (5)
13. (2)
14. (2)
15. (240)
16. (4)
17. (3)
18. (1)
19. (3)
20. (2)
21. (6)
22. (2)
23. (4)
24. (3)
25. (4)
26. (2)

score of the group.[1] This may be read on the vertical scale along the 50-percentile line. The median scores of the freshman and sophomore classes in the sample are 40.5 and 45.5, respectively. These medians may be entered at the foot of the data columns as shown.

Finding variability of scores. The points at which the curve cuts the 25 and 75 percentile lines represent the lower and upper quartile scores of a distribution. The interval between these is the interquartile range — a very convenient measure of the scatter of the distributions. In the sample Percentile Graph the interquartile ranges for the two classes are about 14 points each (freshmen, 33.5 to 47, and sophomores, 39 to 53).

Overlapping of classes. It will be seen by a glance at the percentile curves that the sophomore class is only slightly better than the freshman class and that the distributions of scores of the two classes overlap very markedly. A convenient way to express this overlapping is to say that 30 per cent of the sophomore class fall below the median of the freshman class, or that 30 per cent of the freshman class exceed the median of the sophomore class.

Percentile rank in class. If an individual makes a score exceeding 25 per cent of the scores of his class, he is said to have a percentile rank of 25 in his class; and the same for other percentages. The percentile rank of any individual among the members of his class may be found from the percentile curve representing the scores of his class as follows: Suppose an individual in the sophomore class has made a score of 53. Find the point 53 on the vertical scale in the Percentile Graph and move the pencil horizontally to the point at the same height on the percentile curve. This point represents on the horizontal scale a percentile rank of 79. The percentile rank of the individual among the members of his class is, therefore, 79, which means that his score exceeds the scores of 79 per cent of his class. A score of 53 represents a Percentile Rank of 89 among the members of the freshman class.

In so far as mental ability, as measured by this examination, is an indication of the scholarship to be expected from a student, the percentile rank of a student in class may be taken as showing how he should stand in this regard to the class as a whole.

The meaning of "percentile rank in class" must be distinguished from that of "Percentile Rank," a measure of brightness, referring to the rank of an individual among a large unselected group of his own age.

Reliability and Validity

Reliability. By "reliability" is meant the degree to which the scores of the test are consistent in measuring whatever the test measures. Reliability is determined by means of correlation between different forms of the same test. The coefficients of correlation were found between Forms A and B of both examinations as follows:

Higher Examination, Grades 7 to 12:

Group I, Form A first, 128 cases, $r = .917 \pm .009$
Group II, Form B first, 125 cases, $r = .925 \pm .009$
} avg. .921

Intermediate Examination, Grades 4 to 9:

Group I, Form A first, 215 cases, $r = .953 \pm .006$
Group II, Form B first, 212 cases, $r = .943 \pm .007$
} avg. .948

[1] The value so found may not be exactly the same as the median found in the usual way by counting to the middle paper in order of score, but if not, the median score found by means of the curve is considered to represent the distribution better and to be in that sense more accurate.

The values of the probable error of a score determined from these groups were respectively 2.56 and 2.68 points for the Higher Examination and 2.85 and 2.78 for the Intermediate Examination. The probable error of a score in either examination, therefore, is slightly over 2½ points. This means that the score in either examination will be correct within about 2½ points in half the cases. As has been shown, this means also that the probable error of an IQ is about 2½ points.

Validity. There is no direct method, of course, of finding the true validity of the tests — the degree to which they measure the hypothetical quality we call mental ability. The method of standardization is perhaps the best assurance as to the validity of the tests. Various other indications are available, however. The coefficient of correlation between the Higher Examination and the Advanced Examination taken two years earlier was .889 for 180 cases in Grades 7 to 12. The average of four coefficients of correlation between the Higher and Intermediate Examinations, averaging about 100 cases each in groups covering Grades 7 to 9, was .842. The correlation between scores in the Higher Examination and "scholarship" is reported by Clarence W. Proctor, Principal of High School, Bangor, Maine, as follows:

Grade 11, number of cases 240, $r = .55$
Grade 12, number of cases 204, $r = .57$

The correlation between scores in the Higher Examination and scholarship as reported by the teachers of 157 high school freshmen in Oakland, California, was .59.

The correspondence between scores in the Higher Examination and letter ratings used in connection with Alpha is shown in Table 10.

TABLE 10

ALPHA RATINGS	ALPHA SCORES	SCORES IN HIGHER EXAMINATION
A	135–212	58–75
B	105–134	49–57
C+ . . .	75–104	39–48
C	45–74	28–38
C− . . .	25–44	20–27
D	15–24	15–19
E	0–14	0–14

A high score. One student has been reported to have made a perfect score of 75 points in the Higher Examination in 20 minutes. This student is characterized by the professor of educational psychology of the college as follows:

"The person is a young man just past 21 years of age. He had very poor high school training due to the fact that the schools in his section of North Carolina are not what they should be. He is finishing college in 3½ years with about 8 quarter-hours to spare. I have looked up his college record and find that he has grades of A's or B's. There are no C's, D's, or F's. He won the scholarship medal at college before he came to this institution. (He entered here as a senior.) He is a good mixer, and I do not believe that he puts in very many hours on his studies.

"The father is a rather successful farmer. In fact, from what I can gather, he is the best farmer in his neighborhood. An older brother is a professor in a college. I have had this young man in several classes. It is my firm conviction that he could finish the average college course in two years."

Test Service Bulletins. The reader is invited to send to the World Book Company for free copies of the Test Service Bulletins for further information about testing.

OTIS GROUP INTELLIGENCE SCALE

Devised by ARTHUR S. OTIS

ADVANCED EXAMINATION: FORM A

Name.....
(First name, initial, and last name)

Age last birthday.....years. Birthday.....
(Tell in figures) (Month, day)

School..... Grade.....

City..... Date.....19....
(Month, day, year)

(Do not write below this line.)

Remarks or Further Data

1 .....

2 .....

3 .....

4 .....

5 .....

6 .....

7 .....

8 .....

9 .....

10 .....

11 .....

12 .....

13 .....

14 .....

15 .....

TEST	SCORE
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Score	
Norm	
IB	
PR	

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TEST 1

Following Directions

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Sample problem: Write the fifth letter of the alphabet.....(E)

Begin here:

1. Do you understand that each letter is to be a capital made like printing and put in the parenthesis after the problem? If so, write C in the parenthesis.....( ) 1
2. Will you remember not to ask any questions during the examination? If so, write Q.....( ) 2
3. Will you remember not to look toward the paper of any other pupil during the examination? If so, write L.....( ) 3
4. Will you remember not to turn over your booklet or any page of it at any time unless you are told to? If so, write B; if not, write N.....( ) 4
5. Write the letter O.....( ) 5
6. Write the eighth letter of the alphabet.....( ) 6
7. Write the same letter that you were told to write in the fifth problem.....( ) 7
8. Write the letter which follows the third letter of the alphabet.....( ) 8
9. Write the letter which the letter L follows in the alphabet.....( ) 9
10. If K comes after R in the alphabet, write K; if not, write R.....( ) 10
11. Suppose all the even numbered letters in the alphabet (that is, the 2d, 4th, 6th, etc.) were crossed out. The fifth letter left, not crossed out, would be what letter?( ) 11
12. Write the letter which follows the letter which comes next after B in the alphabet.( ) 12
13. If E and F appear together in the alphabet, write E, unless T and Z also appear together in the alphabet, in which case write T instead.....( ) 13
14. Write the letter which is the third letter to the right of the letter which is midway between K and O.....( ) 14
15. Suppose that the first and second letters of the alphabet were interchanged, also the third and fourth, the fifth and sixth, etc. Write the letter which would then be the 14th letter in the alphabet.....( ) 15
16. A certain letter is the second letter to the left of another letter. This other letter is the fifth letter to the right of Q. What is the "certain letter" first mentioned?..( ) 16
17. A certain letter is the fourth letter to the right of another letter. This other letter is midway between two other letters. One of these last two letters is next after E in the alphabet and the other is just before K in the alphabet. What is the "certain letter" first mentioned?.....( ) 17
18. If the letters in the word IF appear in the same order that they do in the alphabet and if the same is true of the letters in the word AN, write the letter Z. But if this is true of only one of these words, write the last letter of that word.....( ) 18
19. Find the letter which, in this sentence, appears a second time nearest the beginning. Write it, using a capital.....( ) 19
20. Find the two letters in the word AFTER which have just as many letters between them in the alphabet as in the word. Write the one of these two letters that comes first in the alphabet.....( ) 20

Score.....

TEST 2

Opposites

Samples: up ..... (short, down, small, low, young)
hot ..... (warm, ice, dark, cold, fire)

DIRECTIONS. Look at the first word on each line, think what word means exactly the opposite of it, find that word among the five words in parenthesis on that line and draw a line under it.

Begin here:

1. east ..... (north, west, south, pole, equator) 1
2. yes ..... (may-be, wrong, no, sure, nothing) 2
3. top ..... (bottom, side, cover, inside, feet) 3
4. before ..... (late, now, soon, when, after) 4
5. difficult ..... (hard, quick, soft, easy, common) 5
6. friend ..... (brother, acquaintance, enemy, wife, stranger) 6
7. succeed ..... (win, decline, fail, accede, try) 7
8. command ..... (officer, shout, order, obey, soldier) 8
9. beautiful ..... (crooked, handsome, old, ugly, dirty) 9
10. brave ..... (painful, fear, weak, stingy, cowardly) 10
11. pride ..... (sorrow, humility, miserable, conceit, proud) 11
12. expand ..... (burst, smaller, contract, vanish, stay) 12
13. genuine ..... (coarse, counterfeit, adulterated, worthless, impure) 13
14. help ..... (person, work, push, give, hinder) 14
15. love ..... (like, anger, hate, strange, lover) 15
16. graceful ..... (rough, homely, miserable, awkward, stout) 16
17. extravagant .... (miser, humble, economical, poor, wasteful) 17
18. cause ..... (reason, because, origin, effect, why) 18
19. abolish ..... (alter, create, continue, destroy, change) 19
20. loyal ..... (treacherous, enemy, thief, coward, jealous) 20
21. always ..... (sometimes, often, occasionally, seldom, never) 21
22. fickle ..... (silly, constant, stationary, solid, sober) 22
23. therefore ..... (since, why, may-be, there, cause) 23
24. however ..... (nevertheless, moreover, whether, even, never) 24
25. unless ..... (and, therefore, however, also, if) 25

Score .....

TEST 3

Disarranged Sentences

Samples:
- men money for work ..... (true false)
- uphill rivers flow all ..... (true false)
- ocean waves the has ..... (true false)

DIRECTIONS. The words on each line below make one sentence if put in order. If the sentence the words would make is *true*, underline the word *true* at the side of the page. If the sentence they would make is *false*, underline the word *false*.

Begin here:

1. eat grass cows ..... (true false) 1
2. sail ocean ships the on ..... (true false) 2
3. sun morning the the in sets ..... (true false) 3
4. trees birds nests the in build ..... (true false) 4
5. mountains live the in whales ..... (true false) 5
6. comes Christmas a but year once ..... (true false) 6
7. float iron water on will ..... (true false) 7
8. days there in are week seven a ..... (true false) 8
9. usually are of made tables wood ..... (true false) 9
10. has short very a a neck giraffe ..... (true false) 10
11. cream ice children like most ..... (true false) 11
12. milk bees flowers gather the from ..... (true false) 12
13. obtained sea sugar from is water ..... (true false) 13
14. fuel wood are coal and for burned ..... (true false) 14
15. substances light lead gold and are very ..... (true false) 15
16. rivers lakes and many desert has a ..... (true false) 16
17. moon earth the from feet twenty the is ..... (true false) 17
18. hump camel has a his a back on ..... (true false) 18
19. grow and apples ground oranges the in ..... (true false) 19
20. music fond people many are of ..... (true false) 20
21. and eat good gold silver to are ..... (true false) 21
22. clouds rain sky from comes the the in ..... (true false) 22
23. mile a a a travel snail in can minute ..... (true false) 23
24. automobile pocket man his keeps a his in ..... (true false) 24
25. vote persons twenty-one cannot under ..... (true false) 25

Right..... *Wrong*..... *Score*.....

Proverbs

DIRECTIONS. Read each proverb, find the statement that explains it, and put the number of that statement in the parenthesis before the proverb.

Proverbs (Group 1)

( ) Make hay while the sun shines.
( ) A drowning man will grasp at straws.
( ) A stitch in time saves nine.
( ) Rats desert a sinking ship.
( ) In a calm sea every man is a pilot.
( ) Destroy the lion while it is young.
( ) He who would eat the kernel must crack the nut.
( ) One swallow does not make a summer.
( ) People who live in glass houses must not throw stones.
( ) A mouse must not think to cast a shadow like an elephant.

Statements to Explain Proverbs in Group 1

1. It pays to attend to troubles before they get worse.
2. Leadership is easy when all goes well.
3. Make the best of your opportunities.
4. Those who would reap rewards must work for them.
5. It pays to do only one thing at a time.
6. Desperate people cling to absurd hopes.
7. False friends flee from us in disaster.
8. Weed out bad habits before they are too firmly established.
9. It is best to be silent when there is nothing to say.
10. Those who have faults should not criticize others.
11. Do not attempt the impossible.
12. A single sign is not convincing.

Proverbs (Group 2)

( ) Every rose has its thorn.
( ) A tree is known by its fruits.
( ) All is not gold that glitters.
( ) Where there is much smoke there must be some fire.
( ) No wind can do him good who steers for no port.
( ) Plant the crab tree where you will, it will not bear sweet apples.
( ) A bird in the hand is worth two in the bush.
( ) Too many cooks spoil the broth.
( ) Meddle not with dirt — some of it will stick to you.
( ) It is a long road that has no turn.

Statements to Explain Proverbs in Group 2

1. Environment will not change one's nature.
2. There is no happiness without its pain or sorrow.
3. Appearances are often deceptive.
4. It is better to be content with little than to gamble for more.
5. One cannot have the same luck forever.
6. No object can be attained without some sacrifice.
7. Deeds show the man.
8. We cannot help those who have no object in life.
9. Suspicions usually have some basis.
10. Association with evil is sure to leave its effect.
11. Who undertakes too much accomplishes little.
12. Division of responsibility brings poor results.

Score.....

Arithmetic

DIRECTIONS. Place the answer to each problem in the parenthesis after the problem. Do any figuring you wish on the margin of the page.

1. If a boy had 10 cents and earned 5 cents, how much money did he have then? ( ) cents 1
2. At 4 cents each, how much will 12 pencils cost? ( ) cents 2
3. If a man had $25 and spent $10, how much money did he have left? ( ) dollars 3
4. At 6 cents each, how many pencils can be bought for 48 cents? ( ) pencils 4
5. A boy spent 20 cents and then earned 30 cents. How much more money did he have than at first? ( ) cents 5
6. How far can a train go in 5 hours at the rate of 40 miles per hour? ( ) miles 6
7. How long will it take a glacier to move 1000 feet at the rate of 100 feet a year? ( ) years 7
8. If $2\frac{1}{2}$ yards of cloth cost 20 cents, what will 10 yards cost? ( ) cents 8
9. If 2 pencils cost 5 cents, how many pencils can be bought for 50 cents? ( ) pencils 9
10. If a man walks east from his home 7 blocks and then walks west 4 blocks, how far is he from his home? ( ) blocks 10
11. If a boy can run at the rate of 5 feet in $\frac{1}{5}$ of a second, how far can he run in 10 seconds? ( ) feet 11
12. A ship has provisions enough to last a crew of 20 men 50 days. How long would they last a crew of 40 men? ( ) days 12
13. One schoolroom has 7 rows of seats with 8 seats in each row, and another schoolroom has 6 rows of seats with 9 seats in each row. How many more seats does one room have than the other? ( ) seats 13
14. If 10 boxes full of oranges weigh 500 pounds, and each box when empty weighs 5 pounds, what do all the oranges weigh? ( ) pounds 14
15. Town X is 30 miles north of Town Y. Town Y is 15 miles north of Town Z. How far is Town Z from Town X? ( ) miles 15
16. If $3\frac{1}{2}$ yards of cloth cost 70 cents, what will $2\frac{1}{2}$ yards cost? ( ) cents 16
17. If a strip of cloth 36 inches long will shrink to 33 inches when washed, how long will a 48-inch strip be after shrinking? ( ) inches 17
18. If Frank can ride a bicycle 300 feet while George runs 200 feet, how far can Frank ride while George runs 300 feet? ( ) feet 18
19. A hotel serves a mixture of 3 parts cream and 2 parts milk. How many pints of cream will it take to make 25 pints of the mixture? ( ) pints 19
20. If a wire 20 inches long is to be cut so that one piece is $\frac{2}{3}$ as long as the other piece, how long must the longer piece be? ( ) inches 20

Score .....

TEST 6

Geometric Figures

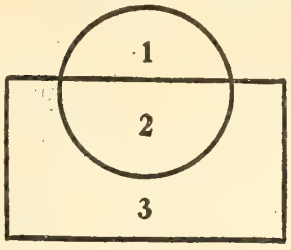


Fig. I

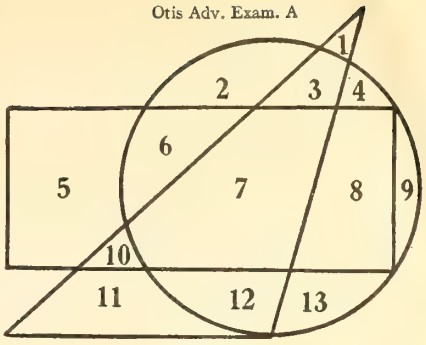


Fig. II

DIRECTIONS. Each problem asks a question that is answered by a number. Write the answer to each problem in the parenthesis after the statement of the problem.

Sample problem:

Look at Fig. I. What number is in the circle but not in the rectangle?.....(1)

1. What number in Fig. I is in the rectangle but not in the circle?.....( ) 1
2. What number in Fig. I is in both the rectangle and the circle?.....( ) 2
3. Look at Fig. II (at the right). What number is in the rectangle but not in the circle nor in the triangle?.....( ) 3
4. What number in Fig. II is in the rectangle and in the triangle but not in the circle? ( ) 4
   (The remaining questions all refer to Fig. II.)
5. What number is in the circle and in the rectangle and in the triangle?.....( ) 5
6. What is the smallest number that is in the triangle but not in the circle nor in the rectangle?.....( ) 6
7. What is the largest number that is in the circle but not in the triangle nor in the rectangle?.....( ) 7
8. Write the number that is in the lowest space that is in the triangle and in the circle but not in the rectangle.....( ) 8
9. Find the geometrical figure (circle, triangle, or rectangle) that has the least number of spaces in it. Write that number of spaces.....( ) 9
10. How many spaces are there each of which is in all three geometric figures?.....( ) 10
11. How many spaces are there each of which is in one and only one geometric figure?..( ) 11
12. How many spaces are there each of which is in two and only two geometric figures?( ) 12
13. We may say that space 12 is *like* space 3 because they are *both* in the circle and triangle but not in the rectangle. Any space is *like* another which is in exactly the same geometrical figures. Write the number of the space which is like space 6.....( ) 13
14. Write the number of the space which is like space 1.....( ) 14
15. How many other spaces are there like space 9?.....( ) 15
16. There is no other space like space 5, so we may call space 5 *unique* (yūneek). Any space is unique which has no other space like it. Examine spaces 8, 9, 10, 11, 12, and 13 in order until you find another unique space. Write its number.....( ) 16
17. How many unique spaces are there in Fig. II?.....( ) 17
18. What is the greatest number of unique spaces which it is possible to make by overlapping a circle, triangle, and rectangle? (You may draw any figures you wish on the margin of this page).....( ) 18
19. Also what is the least number of unique spaces possible?.....( ) 19
20. What is the greatest number of spaces which it is possible to make by overlapping a circle, triangle, and rectangle?.....( ) 20

Score.....

TEST 7

Analogies

Samples:
- finger : hand — toe : (?) . . . . . foot, knee, arm, shoe, nail
- clothes : man — fur : (?) . . . . . coat, animal, hair, skin, cloth
- tall : short — fat : (?) . . . . . man, wide, thin, boy, heavy

DIRECTIONS. The first sample means: Finger is to hand as toe is to what? Underline the word on each line that should go in the parenthesis in place of the question mark.

Begin here:

1. hand : arm — foot : (?) . . . . . leg, toe, finger, wrist, elbow 1
2. peeling : banana — shell : (?) . . . . . skin, orange, egg, juice, ripe 2
3. wool : sheep — feathers : (?) . . . . . pillow, rabbit, bird, goat, bed 3
4. coal : locomotive — (?) : automobile . . . . motorcycle, smoke, wheels, gasoline, horn 4
5. man : woman — brother : (?) . . . . . daughter, sister, boy, mother, son 5
6. automobile : wagon — motorcycle : (?) . . walking, horse, buggy, train, bicycle 6
7. hospital : the sick — (?) : criminals . . . . . doctor, asylum, judge, prison, sentence . . 7
8. hat : head — thimble : (?) . . . . . finger, needle, thread, hand, sewing 8
9. captain : ship — mayor : (?) . . . . . state, council, city, ship, boss 9
10. better : good — worse : (?) . . . . . very good, medium, bad, much worse, best 10
11. grass : cattle — bread : (?) . . . . . butter, flour, milk, man, horses 11
12. large : object — loud : (?) . . . . . soft, small, heavy, weight, sound 12
13. king : kingdom — president : (?) . . . . . vice president, senate, republic, queen, democrat 13
14. revolver : man — (?) : bee . . . . . wings, honey, flying, wax, sting 14
15. egg : bird — (?) : plant . . . . . seed, shell, leaf, root, feathers 15
16. education : ignorance — (?) : poverty . . . laziness, school, wealth, charity, teacher . 16
17. circle : square — sphere : (?) . . . . . circumference, cube, round, corners, ball 17
18. point : line — line : (?) . . . . . surface, pencil, dot, curve, solid 18
19. sanitation : disease — (?) : accident . . . . . doctor, hospital, bandage, cleanliness, care 19
20. ordinary : exceptional — many : (?) . . . . all, none, few, common, more 20
21. sunlight : darkness — (?) : stillness . . . . . quiet, sound, dark, loud, moonlight 21
22. peninsula : land — (?) : ocean . . . . . river, lake, cape, gulf, water 22
23. ellipse : circle — (?) : square . . . . . cube, curve, oval, circle, diamond 23
24. violence : anger — (?) : love . . . . . caressing, hate, temper, hope, happiness 24
25. evolution : revolution — crawl : (?) . . . . baby, floor, stand, run, hands and knees 25

Score . . . . . .

TEST 8

Similarities Test

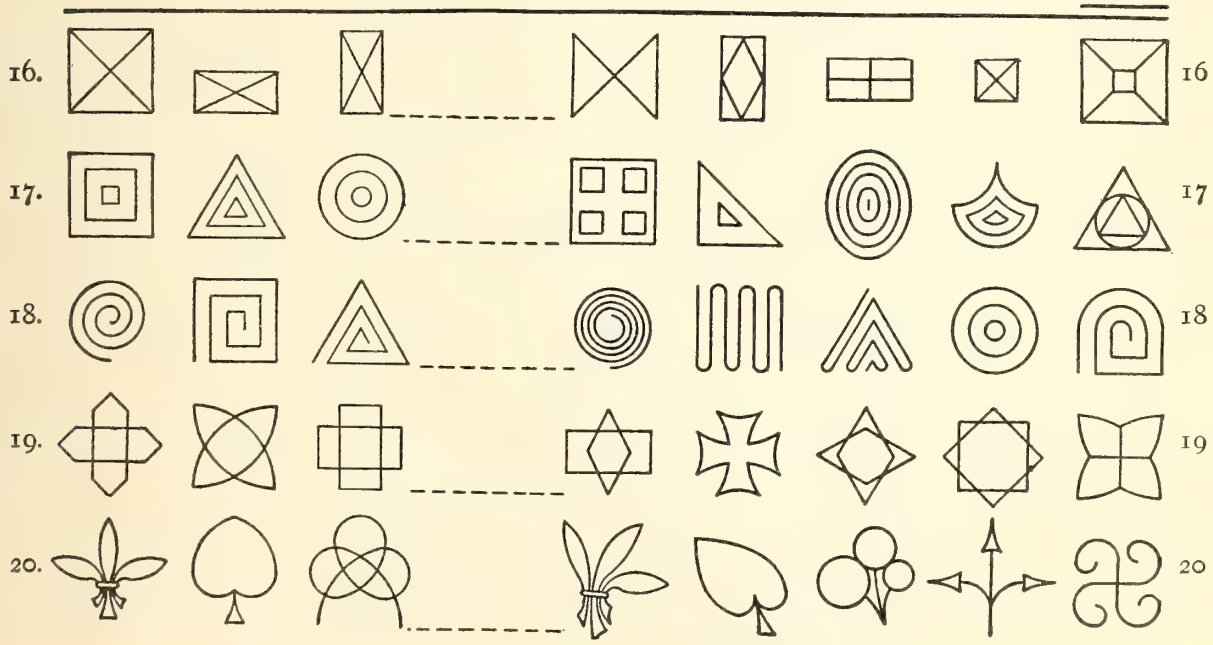
Samples:
- hat, collar, glove.....hand, cane, head, <u>shoe</u>, house
- rose, daisy, violet.....bush, red, plant, bed, <u>pansy</u>
- desk, bed, chair.....book, table, floor, pencil, coat

DIRECTIONS. Find the way in which the first three things on a line are alike. Then look at the five other things on the same line and draw a line under the one that is *most* like the first three.

1.	red, white, green.....rose, paper, grass, soft, blue.....	1
2.	apple, peach, pear.....seed, tree, plum, juice, peel.....	2
3.	pan, bowl, basket.....pail, handle, knife, fork, spoon.....	3
4.	snake, cow, sparrow.....tree, doll, pig, feather, skin.....	4
5.	ship, bicycle, carriage.....sail, automobile, wheel, ocean, harness	5
6.	cannon ball, wire, penny.....dollar bill, bone, string, pencil, key...	6
7.	president, captain, general.....ship, army, king, republic, soldier....	7
8.	book, teacher, newspaper.....pencil, magazine, ink, card, box.....	8
9.	ax, knife, shears.....hammer, razor, hoe, rake, fork.....	9
10.	ivory, snow, milk.....butter, rain, cold, cotton, water.....	10
11.	day, say, gay.....night, said, joy, happy, lay.....	11
12.	nut, turnip, potato.....shell, tree, bush, milk, apple.....	12
13.	strong, bad, fast.....and, man, soon, round, come.....	13
14.	generous, kind, honest.....strong, selfish, wise, loyal, rich.....	14
15.	joy, anger, fear.....habit, memory, hate, life, hearing....	15

Continue below in the same way.

Sample:



Score.....

Narrative Completion

DIRECTIONS. For each numbered blank in the story, choose the best word of the three in the list having the same number as the blank. Underline the word you choose. You may write these words in the blank spaces if you wish, but only the underlining counts. Do nothing about the blanks that are not numbered.

The Reward of Kindness

Once upon a ..... there was a ..... (1) that lived in a ..... One ..... (2) as he was roaming about, (3) he stepped on a ..... and it stuck in his ..... (4) In great pain he ..... out of the ..... (5) in search of some one who (6) would ..... out the .....

At last he saw a ..... and went up to him as if to say, "..... (7) pull this ..... out of my ....." The ..... saw what was the ..... and was so ..... to see the lion suffer that he forgot to be frightened. (8) Very ..... he pulled the thorn out of the lion's foot. The (9) ..... was so ..... that he ..... the shepherd's (10) ..... and went away without ..... him. (11)

Not long after, the ..... (12) was blamed for a cruel deed which he had not ..... The ..... said: "He ..... die. Throw ..... (13) into the lion's den. (14)" So the king's men .... shepherd and put him into the ..... with a great ..... It was the very ..... the shepherd had (15) ..... near the forest. And lo! Instead of ..... the ....., the lion only licked his (16) hand.

The ..... was amazed. He ..... the shepherd to ..... his power over (17) the ..... Then the ..... (18) ..... how he had ..... the ..... of .... Upon ..... this, the (19) ..... said, "This man ..... (20) ..... no ..... deed. Let him go. (21)" So the ..... (22) ..... freed and after that no .... him of ..... (23) ..... Have you heard this story before? (24) (25) .....

Score .....

Underline words here			
1. time	place	man	1
2. man	lion	dog	2
3. street	garden	forest	3
4. tack	thorn	rock	4
5. back	hand	foot	5
6. came	limped	ran	6
7. shepherd	hunter	woodsman	7
8. glad	sorry	anxious	8
9. gently	nicely	suddenly	9
10. angry	hungry	grateful	10
11. hand	sheep	dog	11
12. eating	thanking	harming	12
13. hunter	king	people	13
14. must	may	will	14
15. man	shout	lion	15
16. fighting	killing	helping	16
17. lion	shepherd	king	17
18. explain	give	keep	18
19. softened	relieved	satisfied	19
20. hunger	anger	suffering	20
21. king	people	men	21
22. cruel	kind	good	22
23. dog	lion	shepherd	23
24. knew	accused	hurt	24
25. many	other	cruel	25

TEST 10

Memory

DIRECTIONS. Read each question and if the right answer, according to the story, is *yes*, draw a line under the word *yes*. If the right answer is *no*, draw a line under the word *no*. But if you do not know the right answer, because the story didn't say, draw a line under the words *didn't say*.

Samples:
- Was the story about a king?.....(yes no didn't say)
- Was the king's daughter sixteen years old?.....(yes no didn't say)
- Was she ugly?.....(yes no didn't say)

Begin here:

1. Was the king fond of hearing stories?.....(yes no didn't say) 1
2. Did the king offer his daughter to any one who could tell him a story that would last forever?.....(yes no didn't say) 2
3. Did he offer all his kingdom also?.....(yes no didn't say) 3
4. Did he say, "but if he fails he shall be cast into prison"?.....(yes no didn't say) 4
5. Was the king's daughter pretty?.....(yes no didn't say) 5
6. Did she like stories, too?.....(yes no didn't say) 6
7. Did the story say that after a long time a young man came and offered to tell the king a story?.....(yes no didn't say) 7
8. Did the first man's story last a week?.....(yes no didn't say) 8
9. Was the first man's head cut off?.....(yes no didn't say) 9
10. Did the king then order another man to tell him a story?.....(yes no didn't say) 10
11. Did each man's story last longer than that of the one before?.....(yes no didn't say) 11
12. Were all the young men who came to tell stories handsome?.....(yes no didn't say) 12
13. Did a handsome young man say to the king, "I can tell you a story that will last forever"?.....(yes no didn't say) 13
14. Did the king beg the young man not to try?.....(yes no didn't say) 14
15. Was the king's daughter afraid he would fail?.....(yes no didn't say) 15
16. Did she love him and so not want to see him killed?.....(yes no didn't say) 16
17. Did the young man tell the princess to have no fear?.....(yes no didn't say) 17
18. According to the young man's story, did a rich man order a huge granary built?.....(yes no didn't say) 18
19. Did he have it filled with oats to the very tip-top?.....(yes no didn't say) 19
20. Was a very small hole left between the bricks near the ground?.....(yes no didn't say) 20
21. Was the hole just big enough to let one little ant through?.....(yes no didn't say) 21
22. Did the young man say that one day a little ant went in and carried off a grain of wheat?.....(yes no didn't say) 22
23. Did he say that the next day another little ant went in and carried off another grain of wheat?.....(yes no didn't say) 23
24. Did the king plead with the young man to tell him what happened after that?.....(yes no didn't say) 24
25. Did the young man say, "Why, after that the ants just kept on carrying off the wheat"?.....(yes no didn't say) 25
26. Did the king finally say, "Man, man, your story will last forever"?(yes no didn't say) 26
27. Did he say, "Take my daughter and half my kingdom and don't speak to me again"?.....(yes no didn't say) 27
28. Did the young man marry the princess?.....(yes no didn't say) 28
29. Did the king ever want to hear another story?.....(yes no didn't say) 29
30. Was the name of this story, "The story that had no end"?.....(yes no didn't say) 30

Have you heard this story before?.....(yes no)

Score.....

OTIS GROUP INTELLIGENCE SCALE

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MANUAL OF DIRECTIONS FOR ADVANCED EXAMINATION

CONTENTS

		PAGE
I.	GENERAL PROCEDURE	1
II.	DIRECTIONS FOR ADMINISTERING	1
III.	DIRECTIONS FOR SCORING	6
IV.	DETERMINATION OF NORMS	6
V.	INTERPRETATION OF RESULTS	9
VI.	USES OF INTELLIGENCE TESTS	11

I. GENERAL PROCEDURE

The Otis Group Intelligence Scale is designed to test general mental ability. The scale is issued in two series, a Primary Examination and an Advanced Examination. The Primary Examination is designed especially for the Kindergarten and for Grades 1 to 4. The Advanced Examination is designed for Grades 5 to 12 — in fact, for all literate persons, including university students. To provide for reëxamination after a short interval without the scores being influenced by memory of the previous examination, and also to prevent collusion between groups successively examined, two forms of the scale are available, Form A and Form B. These are different in substance but similar in structure, and the total scores from them are equivalent.

When it is inconvenient to give the entire scale at one sitting, divide and administer in two sittings. The examination booklets should be distributed and the headings filled in as usual, and when the first half of the tests have been administered, the booklets should be collected immediately so that the pupils may not acquaint themselves with the remaining tests. The booklets should be collected in such a manner that, when the pupils are seated in the same seats for the second sitting, the booklets can be returned to them without confusion. At a later period the examination booklets may be distributed again and the examination completed without in any way vitiating results. For young pupils this method is of advantage in that it prevents fatigue.

REËXAMINING

The method of examining pupils in groups is subject, of necessity, to certain limitations. It is impossible for the examiner to be sure in every case that he has the full and undistracted attention at all times of all the pupils being tested. While it is impossible for a really dull person to make a good score in the examination, it occasionally happens that a pupil tested with others in a group does not do himself justice. The most common reasons are nervousness, temporary confusion, or lapse of attention. For this reason, no score should be taken as absolute. Whenever the score of any pupil does not accord reasonably with the quality of his school work or other known facts about his mentality, he should be given further examination. Form B of the scale, in both series, is available for this purpose. Sometimes a second testing in a group will reveal the fact that he was capable of making a better score. If a second examination is given within a short time after the first, a slight allowance should be made for so-called practice effect. If a pupil makes a second score which is more than ten points above the first, however, it is probable that his first score was vitiated in some way and was therefore too low.

Causes which vitiate a pupil's score commonly have the effect of increasing the variability of the pupil's test scores. For example, if a pupil has one or two zero test scores or very low ones along with others considerably above zero, it is probable that these low scores are caused by factors other than mere lack of intelligence. In order to discover whether this is not the case, the pupil may be examined individually and given only those tests in which he failed badly. In any other puzzling case, especially when it may be necessary to pronounce a pupil feeble-minded, an individual examination should be given.

CONSIDERATIONS REGARDING GIVING OF DIRECTIONS

In giving the directions for these tests, it is essential that every point be clearly understood by every one. This can be assured in no other way than by giving the directions slowly and distinctly, with proper expression and emphasis. Before an examiner gives a test for the first time, he should practice the directions several times, preferably with one or more listeners who are unfamiliar with the test. In order that the meaning of each sentence may be fully grasped, it should be followed by a pause. It is impossible to emphasize too strongly the need for these precautions. A good rule to follow is to allow a *pause of* 2 *seconds* after *every sentence.* The procedure may be considered as standardized only on the condition that the examiner makes an adequate pause after every sentence throughout the testing.

II. DIRECTIONS FOR ADMINISTERING

To administer the examination. begin by addressing the pupils as follows: **" We are going to give you this morning (afternoon) some new and interesting tests. The tests are in**

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these booklets which we shall pass to you. There are some blanks to be filled on the front page, and afterward you will be told how to answer the tests. Do not open the booklets until you are told to. Leave them closed on your desks till you are told what to do with them. Part of the test is to see if you can follow directions." Have monitors pass the booklets, right side up, one to each pupil. See that all have pencils — two, if convenient — and erasers. "Then fill in the other blanks down to the black line across the page. Write very plainly; print your name if you can. When you have finished filling the blanks down to the black line, lay your pencils down and fold your arms. Do not open the booklets." Make any necessary additional explanations for young children.

(The space indicated for remarks or further data may be used by the examiner or teacher to record during or after the examination any special information concerning home conditions, sickness, etc., or any irregularities in the examination, such as a pupil's being excused, apparent cheating, misunderstanding of directions, nervousness, etc. If desired for special investigations, the pupils may be directed to write on specified lines their addresses, fathers' occupations, brothers and sisters in school, grades skipped or repeated, or other supplementary data.)

When all have finished filling the blanks on the front of the booklet, say,[1] "Now every one pay attention while I explain further about this examination." (Get the attention of every one before proceeding.) "There is a list of questions or problems on each page. The first list is called Test 1, the second Test 2, etc. You will all begin each test at the same time and stop at the same time. Before you begin each test, I will explain how you are to answer the questions. And while I am explaining, you will hold your pencils up like this." (Show how, holding the pencil on a level with the head.) "You may rest your elbows on the desks if you wish. When I have finished the explanation, I shall say, 'Ready, go.' Keep your pencils up until I say 'Go.' Then you will all start together. You will be told only once what to do in each test; so listen closely. Do not ask any questions. If for any reason you do not know what to do, do what you think is meant to be done. The test is partly to see if you understand what to do after being told once. You may read the directions at the top of the page again if you wish. Do not look at any other pupil's paper to see what is written on it. Do not even look in the direction of any other paper. Keep your eyes on your own paper. Each time you turn a page, fold the book back like this (show) so that only one page shows. Do it quickly, then bring your pencil up like this (show again) as I said. Now remember these four rules: First, keep your pencils up until I say 'Go.' Second, don't ask any questions. Third, don't look toward any other paper. And fourth, don't turn your booklet over or turn any page unless you are told to. Now turn over to Test 1, on the next page. See that it says Test 1 at the top of the page." (If any are slow, say, "Quickly, get the place and bring your pencils up.")

[1] All passages to be read to the pupils are given in bold type. For the sake of uniformity, these should be strictly adhered to.

Test 1. Following Directions

When all pencils are up, say, "This test is to see how well you can follow directions. Notice the alphabet near the top of the page. Each of the directions printed below tells you to write a certain letter of the alphabet. Always write it in the parentheses after the problem, as shown in the sample just below the alphabet. The sample problem says, 'Write the fifth letter of the alphabet.' The fifth letter of the alphabet is E; so the letter E is placed in the parentheses after the problem. In writing these letters always use capitals, and make them like printed capitals so that they can be read easily. When I say 'Go,' begin with No. 1, just below the line that is drawn across the page, and keep on till I say 'Stop.' You will have just 5 minutes. No one is expected to finish all the directions, but do as many as you can. Ready, go!"

After 5 minutes say, "Stop! Turn over your books this way (show) to Test 2 on the next page. See that it says Test 2 at the top. Quickly, then bring your pencils up."

Test 2. Opposites

When all pencils are up, say, "This is a test to see if you know the opposites of certain words. For example, look at the first sample problem near the top of the page. The first word on the line is *up*. Think what is the opposite of *up*. The opposite of *up*, of course, is *down*. And *down* is one of the five words in parentheses on the same line, and it is underlined.

"In each of the problems below, one of the five words in the parentheses is intended to mean exactly the opposite of the first word on the line. The directions say, 'Look at the first word on each line, think what word means exactly the opposite of it, find that word among the five words in the parentheses on that line, and draw a line under it.'

"Now look at the second sample. The first word on the line is *hot*. Think what is the opposite of *hot*. The opposite of *hot*, of course, is *cold*. And the word *cold* in the parentheses is underlined.

"In this way, you are to look at the first word on each line, think what word means exactly the opposite of it, find that word among the five in the parentheses on the same line, and draw a line under it.

"When I say 'Go,' begin with No. 1 and keep on till I say 'Stop.' You will have only a minute and a half this time. Ready, go!" After 1½ minutes say, "Stop! Turn over one page, quickly, to Test 3." (See that all books are folded back.)

Test 3. Disarranged Sentences

When ready, say, "Below are some sentences. The words in each sentence are mixed up so that they do not make sense. Look at the first sample: *money*, *for*, *work*, *men*. These words would make a sentence if put in the order, Men work for money. This statement is true; so the word *true* on that line is underlined. Notice the second sample: *uphill*, *rivers*, *flow*, *all*. To make a sentence of these words they should be put in the order, All rivers flow uphill. This statement is false; so the word *false* is underlined.

" Every one look at the third sample and think whether you would underline *true* or *false*." (Pause 10 seconds.) Then say, " You would underline *true*, because the sentence is, ' The ocean has waves,' and that is true.

" Now, as the directions say, the words in each line below would make one sentence. Some of the sentences would be true and some would be false. You are to look at the words on each line and decide what sentence they would make, using all the words, but *do not write the sentence*. Then, as the directions say, if the sentence the words would make is *true*, underline the word *true* at the side of the page. If the sentence they would make is *false*, underline the word *false*. You will have a minute and a half. Ready, go! " After $1\frac{1}{2}$ minutes say, " Stop! Turn your books over to Test 4."

Test 4. Proverbs

" On this page are two groups of proverbs, each group containing 10 proverbs. Each proverb in Group 1 is explained by one of the statements in the group just below the proverbs. There are 10 statements to explain the 10 proverbs and 2 extra statements which do not explain any proverbs, making 12 statements in the group. The same is true of the second group of proverbs and the second group of statements. The test is to find the statement that explains each proverb. The directions say, ' Read each proverb, find the statement that explains it, and put the number of that statement in the parentheses before the proverb.' For example, look at the first proverb ": (Read Form A only or Form B only.)

[*Form A*] " Make hay while the sun shines.

[*Form B*] " The early bird catches the worm.

" Now look at the statements. Statement No. 1 says:

[*Form A*] " It pays to attend to our troubles before they get worse.

[*Form B*] " It is foolish to worry about things we can't help.

" If Statement No. 1 explains the first proverb, put a figure 1 in the parentheses before the proverb. If not, look at Statement No. 2.

[*Form A*] " Leadership is easy when all goes well.

[*Form B*] " People seek the company of those who are like them.

" If Statement No. 2 explains the first proverb, put a figure 2 in the parentheses before the proverb. If not, read on till you find the statement that does explain it and write the number of that statement in the parentheses before the proverb. Then take the next proverb and do the same, etc.

" When you have finished the first 10 proverbs, go right on to the next 10 in Group 2. The statements which explain these are among the 12 statements below the proverbs in Group 2. Answer these in the same way. Make your figures very plain. You will have 6 minutes. Ready, go! " After 6 minutes say, " Stop! Turn over one page to Test 5."

Test 5. Arithmetic

" This test is a list of ordinary arithmetic problems. Work each one as you would any arithmetic problem. The directions say, ' Place the answer to each problem in the parentheses after the problem. Do any figuring you wish on the margin of the page.' You will have 6 minutes. Ready, go! " After 6 minutes say, " Stop! Turn your books over to Test 6."

Test 6. Geometric Figures

" This is a test to see if you can find certain numbers in the geometrical figures near the top of the page. The directions say, ' Each problem asks a question that is answered by a number. Write the answer to each problem in the parentheses after the statement of the problem.' For example, the sample problem says, ' Look at Fig. 1.' (Fig. 1 is the smaller drawing, in the middle of the page.) Then it says, ' What number is in the circle but not in the rectangle? ' Now you will see that the number that is *in the circle* but *not in the rectangle* is the number 1; therefore a figure 1 has been placed in the parentheses after the statement of the problem.

" In that way, find the answer to each problem and write it in the parentheses. You will have 6 minutes. Ready, go! " After 6 minutes say, " Stop! Turn over one page to Test 7."

Test 7. Analogies

" To understand this test look at the first sample problem: finger, hand, toe, and then a question mark. As the directions say, the first sample means: a finger is to a hand as a toe is to what, and you are to think what that is. The answer is one of the five words following on the same line. The directions say, ' Underline the word on each line that should go in the parentheses in place of the question mark.' Now, in this case, a *finger* is to a *hand* as a *toe* is to a *foot*, because a finger is *part* of a hand and, in the same way, a toe is *part* of a foot. Therefore the word *foot* is underlined. Now notice the second sample: *Clothes* are to *man* as *fur* is to what? Here the right answer is *animal*, because *clothes* keep a *man* warm and in the same way *fur* keeps an *animal* warm. Therefore the word *animal* is underlined. Now look at the third sample. Read it and think which word you would underline."

(Pause 10 seconds.) " *Short* is the *opposite* of *tall*, and the opposite of *fat* is *thin*. So you would underline the word *thin*. Some of the problems, as, for example, Problem 4, read a little differently. Problem 4 simply means:

[*Form A*] "*Coal* is to a *locomotive* as *what* is to an *automobile?*

[*Form B*] " A *boy* is to a *man* as *what* is to a *sheep?*

" It is answered in the same way. You will have 3 minutes. Ready, go! " After 3 minutes say, " Stop! Turn your books over to Test 8."

Test 8. Similarities

" This is a test to see if you can tell the ways in which certain things are alike. For example, look at the samples. Notice the first three things mentioned in Sample 1: *hat*, *collar*, *glove*. Think how these are alike. You see they are alike because they are all *things to wear*. Now find one of the other five things mentioned on that line that is also a thing to wear. You see that it is *shoe* and *shoe* is underlined. The

directions just below the samples say, 'Find the way in which the first three things on a line are alike. Then look at the other five things on the same line and draw a line under the one that is most like the first three.'

"Now look at the second sample. Think how the first three things are alike: *rose*, *daisy*, *violet*. You see they are all alike because they are all *flowers*. Now look at the other five words on that line and find the name of a flower. You see the name of the flower is *pansy;* so *pansy* is underlined.

"Now look at the third sample and think what word you would underline." (Pause 10 seconds.) Then say, "*Table* should be underlined, because *desk*, *bed*, and *chair* are articles of furniture and the article of furniture mentioned among the other five is *table*.

"When you get down to the drawings, do exactly the same. That is, find the way in which the first three on each line are alike and draw a line under the one of the other five that is *most* like the first three. The first line of drawings is a sample problem. You will have 4 minutes. Ready, go!" After 4 minutes say, "Stop! Turn over one page to Test 9."

Test 9. Narrative Completion

"This page contains a story with a number of the words left out. You will notice that some of the blanks are numbered. The test is to see if you can tell what words should go in the numbered blanks. Thus you will see that the story reads:

[*Form A*] "Once upon a . . . . . (blank No. 1) there was a . . . . . blank No. 2) that lived in a . . . . . (blank No. 3), etc.

[*Form B*] "Once upon a . . . . . (blank No. 1) there was a . . . . . (blank No. 2) who was very . . . . . (blank No. 3, etc.).

"The words that should go in the numbered blanks are among those in the list at the right. The word that goes in the blank numbered 1 is one of the three words opposite the number 1 —

[*Form A*] time, place, man.
[*Form B*] time, place, tree.

The word that belongs in the blank numbered 2 is one of the three words opposite the number 2 —

[*Form A*] man, lion, dog.
[*Form B*] bird, man, woman.

The word that belongs in the blank numbered 3 is one of the three words opposite the number 3 —

[*Form A*] street, garden, forest.
[*Form B*] rich, strong, poor.

etc. The directions say, 'For each numbered blank in the story, choose the *best* word of the three in the list having the same number as the blank, and *underline* the word you choose. You may write these words in the blank spaces if it will help you, but be sure to underline the words in the list. You need do nothing about the blanks that are not numbered.' Now before you do any underlining, read the first two paragraphs, to see what the story is about. Then underline the right words in the list. The first word you will underline, of course, is the word *time*. You will have 6 minutes. Ready, go!" After 6 minutes say, "Stop! *Do not* turn over your books. Leave them as they are. Lay your pencils down and fold your arms."

Test 10. Memory

"Listen carefully while I explain what you are to do in the next test. This is a test to see if you can remember a story that is told you. I will read a story, and then when you turn over to the next page you will find questions about the story.

(For *Form A* continue here. For *Form B* skip to the first column on the next page and continue where indicated.)

"The questions will be like these: Was the story about a king? Was the king's daughter sixteen years old? Was she ugly? Was the king fond of hearing stories? etc.

"Now listen carefully while I read the story and see how much of it you can remember. The name of the story is, 'The Story That Would Last Forever.' And this is the story:[1]

"Once upon a time there was a king who was very fond of hearing stories. He liked them so well that one day he said, 'If any one can tell me a story that will last forever he may marry my daughter and take half my kingdom, but if he fails he shall have his head cut off.'

"Now the king's daughter was very pretty and very lovable, and so many young men wanted to win her for a wife. [½ minute.] Soon a young man came and offered to tell the king a story. He talked all that day and all the next day and all the next day, and so on. But at the end of seven days his story came to an end and he could not think of any more to add to it; so his head was cut off. Then another young man came and offered to tell the king a story. At the end of seven days he was still telling his story, but at the end of the fourteenth day his story came to an end, and he could not think of any more to add to it; so his head was cut off. [1 minute, 5 seconds.] After that many other young men tried to tell a story that would last forever, but after a month, or two months, or three months, their stories came to an end, and they could not think of any more to add to them; so their heads were cut off. [1 minute, 25 seconds.]

"Finally a handsome young man came and said to the king, 'I can tell you a story that will last forever.' The king's daughter begged the young man not to try, for she was afraid that he too would fail, and she did not want to have another fine young man killed. But the young man said, 'Have no fear, Princess, I will not fail,' and he began to tell the king this story: 'Once upon a time a rich man ordered a huge granary built' [2 minutes] — a granary is a storehouse for grain — 'and had it filled with wheat to the tip top. But when it was built there was still a very small hole, between the boards, near the ground, just big enough to let one little ant through. One day a little ant went in and carried off a grain of wheat. Then another little ant went in and carried off another grain of wheat. [2½ minutes.] Then another little ant went in and carried off another grain of wheat.' And so on. Day after day, week after week, the story teller

[1] The reading of this story should consume approximately 3½ minutes.

kept saying, ' Then another little ant went in and carried off another grain of wheat.'

" At last the king grew tired of hearing the same thing over and over, and pleaded with the young man to tell him what happened after that. But the young man only said, ' Why, after that another little ant went in and carried off another grain of wheat.' [3 minutes.]

" Finally the king said, ' Man, man, you will drive me crazy. Take my daughter and half my kingdom and never mention ants to me again.'

" So the young man married the princess, and they lived happy ever afterward. And the king never asked any one after that to tell him a story that would last forever." [3½ minutes.]

When you have finished reading the story, say, " Now turn your books over to Test 10." When ready, say, " Now look at the samples. The first sample question reads: ' Was the story about a king? ' and the answer, of course, is *yes;* so *yes* is underlined at the right. The next question reads: ' Was the king's daughter 16 years old? ' and you don't know, because the story didn't say how old she was. So the words *didn't say* are underlined. The next question reads: ' Was she ugly? ' The story said she was pretty; so the answer to that question is *no*, and *no* is underlined.

" Now, as the directions say, read each question, and if the right answer, according to the story, is *yes*, draw a line under the word *yes*. If the right answer is *no*, draw a line under the word *no*. But if you do not know the right answer because the story didn't say, draw a line under the words *didn't say*. You will have 3 minutes. Ready, go! " After 3 minutes say, " Stop! Close your books. Lay your pencils down."

Have the monitors collect the booklets, keeping all right side up. Tie up the pile of booklets, with the Record Sheet placed inside the top booklet.

(For *Form B* continue here.)

" The questions will be like these: Was the story about two shepherds? Were they both honest? Were they brothers? Did the first shepherd have a large flock of sheep? etc.

" Now listen carefully while I read the story and see how much of it you can remember. The name of the story is ' The Two Shepherds.' And this is the story: [1]

" Once upon a time in a small village there lived two shepherds. One of them had only a few sheep in his flock, but they had fine white wool. He knew them so well that he called each one by name. He had no shepherd dog to watch his sheep and keep them from getting lost; so he had to watch them very carefully himself. He followed them from place to place while they sought fresh grass. [½ minute.]

" One day he was very tired and lay down under a tree to take a nap. He thought he would sleep only a little while and that when he awoke he would find his sheep not far away. But he slept so long that when he awoke he could not see his sheep. He hunted all the rest of the day and could not find them anywhere. When night came, he sat down and wept over the loss of his sheep. [1 minute.]

" Mercury saw him weeping, and came up to him and said, ' Why do you weep, my good shepherd? '

" ' I have lost my sheep,' said the shepherd.

" ' Come with me,' said Mercury, ' and I will help you find them.' Then Mercury led the shepherd to a distant pasture surrounded by a forest, and there they saw a flock of sheep with silver fleece. ' Are these your sheep? ' asked Mercury.

" ' No,' said the shepherd. Then they went farther. In another pasture they found a flock of sheep with golden fleece.

" ' Are these your sheep? ' asked Mercury.

" ' No,' said the shepherd. Then they went farther and found a little flock of sheep with fine white wool. ' Ah! Here are my sheep,' said the shepherd; ' I know them, every one.' And he called them by name.

" Mercury was pleased that the shepherd loved his sheep better than gold and silver, and to reward him he gave the shepherd all the sheep they had seen. [2 minutes.]

" When the other shepherd saw the sheep with the gold and silver fleece, he was very envious and asked the shepherd where he had found them. When he told the story, the other shepherd at once resolved to try to get for himself some sheep with gold and silver fleece. So the next day he tied up his shepherd dog, took his sheep to pasture, and lay down to sleep. When he awoke, his sheep too had strayed away. He began at once to sob loudly. Mercury, hearing him, came up and said, ' Why do you weep, my good shepherd? '

" ' I have lost my sheep,' said the shepherd.

" ' Come with me,' said Mercury, ' and I will help you find them.' Then Mercury led the shepherd to a distant pasture, where they found a flock of sheep with silver fleece. [3 minutes.] ' Are those your sheep? ' asked Mercury.

" ' Yes,' said the shepherd, ' but not all of them.' In another pasture they found a flock of sheep with golden fleece.

" ' Are these your sheep? ' asked Mercury.

" ' Yes,' said the shepherd, ' these are the rest of my sheep.'

" Whereupon Mercury said, ' You are a dishonest man. These are not your sheep. Now you may go and try to find your own sheep. But you will never find them.'

" That is the end of the story. Now turn your books over to Test 10." When ready, say, " Now look at the samples. The first sample question reads: ' Was the story about two shepherds? ' and the answer, of course, is *yes;* so the word *yes* is underlined. The next question reads: ' Were they both honest? ' and the answer is *no;* so the word *no* is underlined. The next question reads: ' Were they brothers? ' but you don't know, because the story didn't say whether they were brothers or not; so the words *didn't say* are underlined.

" Now, as the directions say, read each question and if the right answer, according to the story, is *yes*, draw a line under the word *yes*. If the right answer is *no*, draw a line under the word *no*. But if you don't know the right answer because the story didn't say, then draw a line under the words *didn't say*. You will have 3 minutes. Ready, go! " After 3 minutes, say, " Stop! Close your books. Lay your pencils down. Now each one pick up the slip of paper that you wrote your name on first. Put it right side up under the first page of

[1] The reading of this story should consume approximately 3½ minutes.

your book. Then close your book." Have the booklets collected immediately.

III. DIRECTIONS FOR SCORING

General Plan

The general plan of scoring is as follows. First, the Score in each test is obtained. In all cases except that of Test 3 (see below) the Score will consist of the number of right responses. The Test Scores are then added to find the Total Score, the measure of the pupil's Mental Ability.

There is provided in each package of test booklets a key consisting of a card, the same size as the test booklet; on the edges of the card are printed the correct answers to the ten tests.

The method of using the key is as follows: Place the key over the test booklet so that the appropriate column of correct answers is opposite the pupil's responses. Compare these carefully and note each case of disagreement.

It is suggested for the scoring of all tests except Test 3 that there be placed either a horizontal line (−) opposite each correct answer, or a cross (×) opposite each incorrect or omitted answer, or both horizontal lines and crosses, and a line drawn under the number of the last problem answered. Then by adding the number of lines or subtracting the number of crosses from the number of the last problem answered, the Score may be found.

When a large number of test booklets are to be scored and several scorers are available, it is convenient to divide the scoring, letting each scorer devote himself to one or two tests. In this way he soon becomes familiar with the answers and can score the test or tests much more rapidly and easily than otherwise.

It is advisable under any circumstance to have the papers scored twice, for it is practically impossible to score a set of booklets without making a few errors. At least a few should be rescored to discover whether errors of scoring are being made.

Special Directions

In the case of each test, except the Disarranged Sentence Test (Test 3), one credit is to be given for each correct answer, and no credit for wrong or omitted answers. In the case of the Disarranged Sentences, however, since there are but two alternate answers, *true* and *false*, theoretically, of the answers given concerning the sentences not properly solved by any pupil, but guessed at, one half may be right by chance. Therefore if, say, 15 of the 25 sentences were properly solved and correctly answered, and 6 of the remaining 10 guessed at, leaving 4 blank, of the 6 guessed at 3 might be right by chance. This would make 18 right, 3 wrong, and 4 blank. This suggests that as many credits should be deducted from the 18 as were wrong (3), thus giving a score of "right minus wrong," or 18 − 3 = 15, the proper score. A person guessing at 24 of them, and getting 12 right by chance, would then attain a score of 12 − 12 = 0.

In scoring Test 3 a horizontal line should be placed after each correct answer, a cross after each incorrect answer *only*, and (if desired) an O after each omitted answer (blank). The score is then the number "right-minus-wrong"; that is, the number of horizontal lines minus the number of crosses. If in any case the score thus obtained comes out negative, call it 0. In the case of Test 3 if a pupil has underlined True all the way down or False all the way down apparently without discrimination, call the score for that test zero.

If in any test two or more answers are underlined in such a way as to be equivocal, the item counts as if omitted; that is, neither right nor wrong in Test 3. It may often happen that an examinee has failed to follow the directions given for indicating answers. Such failure may consist in checking answers instead of underlining, crossing off wrong answers instead of underlining right ones, not placing answers in the proper parentheses, writing answers when they should be underlined, failure to underline the words in Test 9, carelessly underlining two or more alternative answers without crossing off those not intended, etc. In general, the following principle is to guide in scoring such tests: *Ascertain if possible the intent of the examinee and score accordingly.*

Recording Scores

For convenience in recording scores a Class Record is furnished in each package of test booklets. The copying of the scores in the separate tests on to the Class Record is optional.

IV. DETERMINATION OF NORMS

The median or middle score of unselected children of a given age is called the normal score or *norm* for that age. The norms for the Advanced Examination for ages 8 to 19 are shown in Table 4. The description of the derivation of this table is given later.

The table of norms is based upon the scores of 25,226 pupils from some 200 cities throughout the country. The pupils whose scores have been received were distributed in the grades as shown in Column 2 of Table 1. Their scores were distributed as shown in Table 2, on page 7.

TABLE 1

Showing the Manner of Augmenting Distributions of Scores of Pupils in the Various Grades to Adjust the Proportion to That Actually Existing in Schools

Grade	Distribution of Pupils Tested in the Various Grades	Proportion of Pupils in Grades (Bonner)	Augmented Distributions of Pupils in Grades to Adjust Proportions
4	1500	122	7479
5	3058	115	7050
6	4298	109	6681
7	3896	91	5578
8	4598	75	4597
9	3627	60	3678
10	1976	38	2329
11	1047	25	1531
12	1226	20	1226
Totals	25226		40149

These numbers of pupils tested in the various grades are not in the proportion of pupils as they actually exist in the

TABLE 2

SHOWING THE DISTRIBUTIONS OF ACTUAL SCORES OF PUPILS OF THE VARIOUS GRADES, ALL AGES COMBINED

(*Advanced Examination*)

Grade \ Score	0 TO 9	10 TO 19	20 TO 29	30 TO 39	40 TO 49	50 TO 59	60 TO 69	70 TO 79	80 TO 89	90 TO 99	100 TO 109	110 TO 119	120 TO 129	130 TO 139	140 TO 149	150 TO 159	160 TO 169	170 TO 179	180 TO 189	190 TO 199	200 TO 209	210 TO 219	TOTALS
4	33	121	246	248	247	196	165	121	62	37	12	7	3	2									1500
5	6	41	112	257	419	522	475	425	331	213	127	74	35	14	5	1	1	1					3058
6		3	19	74	168	334	504	659	738	587	499	346	193	97	51	20	5		1				4298
7		3	11	24	55	142	287	408	605	624	592	472	322	198	92	42	14	4	1				3896
8			4	5	18	53	126	242	423	598	695	761	585	485	287	185	89	30	9	3			4598
9						9	40	79	174	262	443	520	541	547	409	317	190	62	24	10			3627
10						2	6	22	39	78	125	239	289	323	316	234	173	85	35	10			1976
11						1	1	4	15	25	39	66	99	123	160	150	145	91	76	43	8	1	1047
12									6	23	38	58	95	153	187	191	187	139	85	50	13	1	1226
Total																							25226
Normal School Students								6	11	26	51	103	125	216	242	324	313	284	186	91	38	8	2024

grades, since relatively few of the pupils of the lower grades were tested. The ratios of pupils actually in Grades 4, 5, 6, etc., are as 122 : 115 : 109 : etc., as shown in Column 3 of Table 1, according to Bonner (Bulletin No. 24, 1920, Bureau of Education, page 91). In a school population containing 1226 pupils in the 12th grade, the corresponding numbers which would be found in the other grades are as shown in Column 4 of Table 1. Before finding the median score of 10-year pupils, for example, it is necessary to have the scores of the pupils of the several grades in the correct proportion; otherwise the proportion of duller 10-year pupils from the lower grades will be too small. To correct for this possible error, the frequencies in the distributions of scores of the various ages in Grades 4 to 11 have been augmented proportionately, so that the total number of scores for the several grades would equal the numbers given in Column 4 of Table 1. This gave the hypothetical distributions of scores of a school population of 40,149 pupils grouped in the correct proportions in the several grades. These augmented distributions, recombined according to age instead of grade, are shown in Table 8, on page 12. The distributions of the scores of pupils of each age group, all grades combined, are shown graphically in Figure 1. The scores exceeded by 10 per cent, 25 per cent, 50 per cent, 75 per cent, and 90 per cent, respectively, of each age group (given in Table 3) are shown by dots in the upper portion of Figure 2.

It is important to note in this connection that there are very few 8-year pupils in the fourth or fifth grades, and such as are in these grades are without doubt much brighter than 8-year pupils as a whole. The same is true to a lesser degree of 9-year pupils in these grades. Therefore, as shown in Figure 1, the assumption was made that the distributions of scores of pupils of the 8- and 9-year groups would be distributed as shown by the dotted lines if all pupils of these ages were included. The medians of these hypothetical distributions were taken, therefore, as more probably approximating the true norms for the ages of $8\frac{1}{2}$ and $9\frac{1}{2}$. The curved line in Figure 2 was accordingly drawn through these hypothetical medians.

Similarly the numbers of pupils of age groups 16, 17, and 18 become increasingly smaller, due doubtless to dropping out of duller pupils. It is assumed, therefore, that if these pupils had remained in school, the distributions of scores of these age groups would be as shown by the dotted curves with median scores of 124, 129, and 130, respectively. These were taken, therefore, as the norms for ages $16\frac{1}{2}$, $17\frac{1}{2}$, and $18\frac{1}{2}$, and the curve in Figure 2 drawn accordingly. The complete table of norms (Table 4) was then compiled from the curve in Figure 2 by noting the height of the curve at points representing each month of age.

TABLE 3

REPRESENTATIVE PERCENTILE SCORES

PERCENTILE	10 PER CENT	25 PER CENT	50 PER CENT	75 PER CENT	90 PER CENT
Grade					
4	19	29	44	62	80
5	36	48	63	80	97
6	55	69	85	102	117
7	65	80	97	113	128
8	80	95	112	128	144
9	92	108	125	142	157
10	106	120	136	153	166
11	113	131	149	167	184
12	120	136	154	169	183

TABLE 4

NORMS FOR ADVANCED EXAMINATION

YEAR	8	9	10	11	12	13	14	15	16	17	18	19
Month												
0 . .	25	40	55	68	80	90	100	110	120	127	130	130
1 . .	26	41	56	69	81	91	101	111	121	127	130	130
2 . .	27	42	57	70	82	92	102	112	122	128	130	130
3 . .	28	43	58	71	83	93	103	113	123	128	130	130
4 . .	30	45	59	72	84	94	104	114	123	128	130	130
5 . .	31	46	60	73	85	95	105	115	124	128	130	130
6 . .	32	47	61	74	85	95	105	115	124	129	130	130
7 . .	33	48	62	75	86	96	106	116	125	129	130	130
8 . .	35	50	63	76	87	97	107	117	125	129	130	130
9 . .	36	51	64	77	88	98	108	118	126	129	130	130
10 . .	37	52	65	78	89	99	109	119	126	129	130	130
11 . .	38	53	66	79	90	100	110	120	127	129	130	130

Examiners who discover that considerably more than 50 per cent of their high school pupils obtain Intelligence Quotients above 100 are occasionally disturbed by the belief that there is something wrong in their calculations. This condition, however, is to be expected. The median scores of pupils of ages $16\frac{1}{2}$, $17\frac{1}{2}$, and $18\frac{1}{2}$ who are *in school* are respectively 135, 143, and 147, as shown by the positions of the dots in Figure 2. That is, 50 per cent of pupils of these ages who are in high school and grammar school obtain scores in excess of these scores. Students in high school only, being still more selected, are as a group, therefore, considerably above normal in brightness.

Mental Age

The term Mental Age has arisen in connection with the Binet-Simon Tests. To say that a pupil has a mental age of 10 years means that he has the mental ability of a normal 10-year child. In general, then, the mental age of a pupil is the age of the normal child having his degree of mental ability.

There are, however, degrees of mental ability attained by bright individuals at or nearing maturity which are above that normal for any age, just as some individuals attain heights above the median of adults. In order to express those degrees of mental ability in terms of "mental age," the mental age scale has been extended artificially in the upper ranges for use with the Binet-Simon Tests. For a more complete explanation of this point see Chapter XIII of *Statistical Method in Educational Measurement*, by Arthur S. Otis, published by World Book Company.

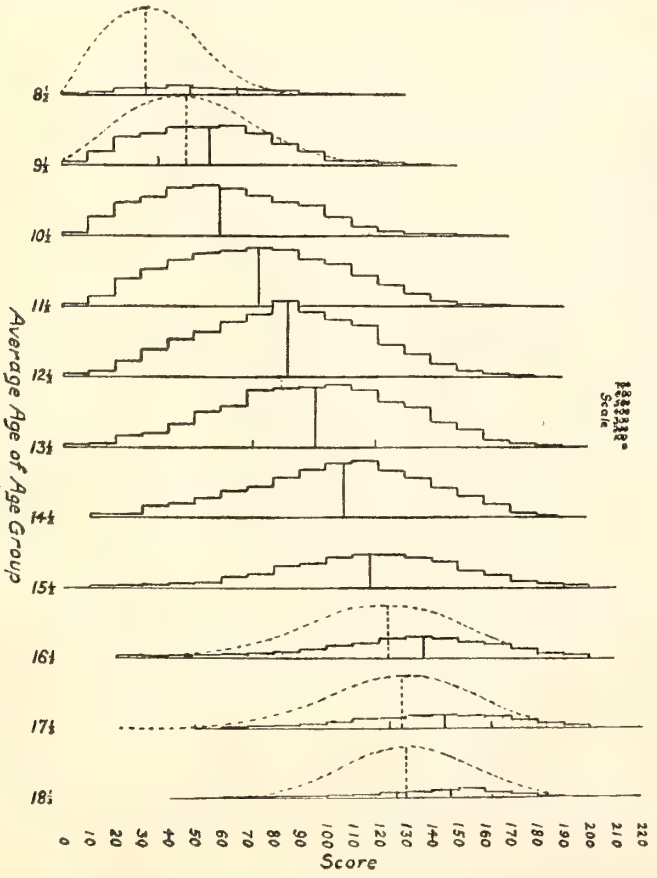


Fig. 1. Showing the distributions of scores of pupils of the various age groups. Age group $8\frac{1}{2}$ includes all pupils from 8 years, 0 months, to 8 years, 11 months, etc.

To find the Binet Mental Age of a pupil from his score in the Advanced Examination, consult Table 5, on page 9. Note that Binet Mental Ages in the upper ranges are artificial and are not the ages for which those degrees of mental ability are normal.

A mental age obtained from this table is the most probable Binet Mental Age that corresponds to the given score on the Advanced Examination. For some as yet unexplained reason, for pupils of a given chronological age the variability of the distribution of their mental ages obtained from a group test tends to be greater than the variability of such a distribution obtained from the Binet test. That is, for a dull pupil the mental age obtained from Table 5 will tend to be too low and for a bright pupil it will tend to be too high. Therefore IQ's should not be computed from this table, but from Table 7 (page 11).

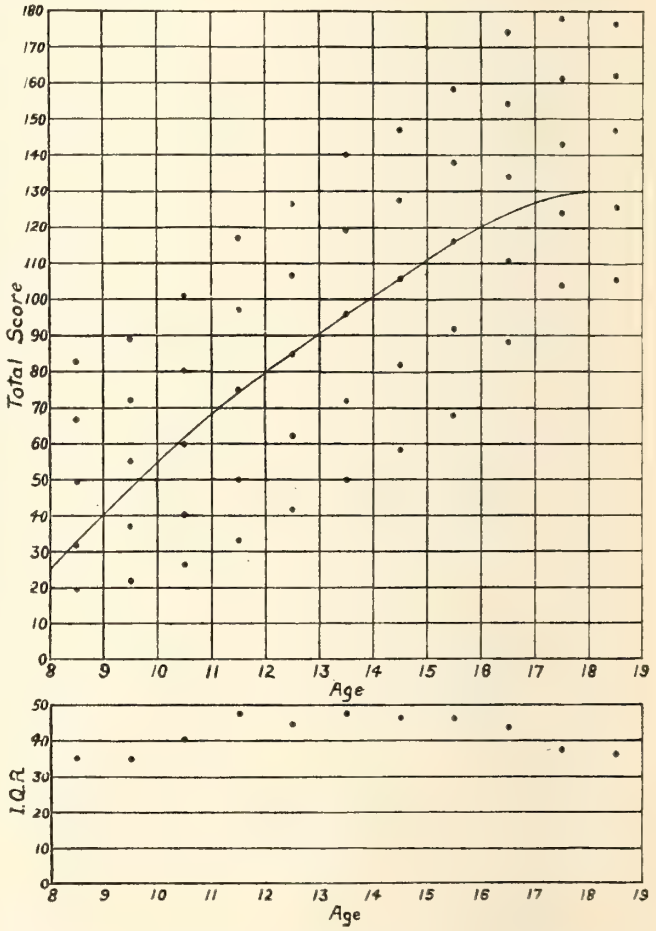


Fig. 2. Showing (above) the scores attained by 10 per cent, 25 per cent, 50 per cent, 75 per cent, and 90 per cent respectively, of each age group, and (below) the interquartile ranges of the distributions of scores of each age group.

Normal School Students

The distribution of scores of 2024 normal school students of 20 normal schools is shown at the foot of Table 2. The five characteristic percentile scores are as follows:

Normal School Students	Percentile	10	25	50	75	90
	Score	120	138	157	173	187

V. INTERPRETATION OF RESULTS

Intelligence and Brightness

There are two aspects of the mind of a child that must not be confused. One is his degree of *Mental Ability* and the other is his degree of *Brightness*.

Mental Ability is that growing ability in a child which enables him, year by year, to think more abstractly and solve more difficult problems. Growth in mental ability may be thought of as growth in thinking power.

Brightness is that fixed quality of mind which determines the rate at which a child's thinking power shall grow. It is differences in brightness that cause children of the same age to differ in mental ability and that enable some individuals to reach ultimately a higher level of intellectual power than others.

Mental Ability is measured in terms of score in a mental ability test, while Brightness is measured by the so-called Intelligence Quotient (see page 10). These are derived measures and are obtained only by consideration of a pupil's score or mental age in the light of the score or mental age that is normal for the age of the pupil in question.

The term Intelligence unfortunately has been used by nearly all writers both as meaning mental ability and as meaning brightness, and much confusion of thought has arisen on account of this double usage. Pending the standardization of the definition of the word Intelligence, it has seemed best to avoid its use when necessary to distinguish between mental ability and brightness.

The hypothetical individual of exactly normal or average brightness progresses in mental growth in such a manner that at each year of age he attains a score just equal to the median or middle score of children of that age. The above hypothetical individual of exactly normal brightness, if tested at the age of 8 years, would make a score in the Advanced Examination of 25 points; if tested at the age of 9 years, his score would be 40 points, etc. His progress in terms of score is approximately uniform until the age of about 15 years, when the yearly increments of growth in terms of score decrease until the age of 18 years, beyond which apparently no further growth takes place. At 18 years of age an individual's natural mental ability is fully developed. Thereafter he merely acquires knowledge, experience, wisdom, and so on. The mental growth of a normal individual in terms of the score he should attain in the Advanced Examination is shown graphically by the curve in Figure 2 (page 7).

Of several thousand pupils taken at random from the school population of the country, whose " age last birthday " was 12 years and whose average age therefore was 12 years and 6 months, the median score in the Advanced Examination was 85 points. We should expect the hypothetical child of exactly normal brightness, therefore, at the age of 12 years and 6 months to attain a score of 85 points. We find, however, that the actual scores of these pupils range from almost zero to nearly 190, as shown in Table 7 (page 12).

This wide range of scores of a group of pupils of the same age is due to the fact that certain children have an innate capacity for greater mental achievement than others, which operates to give them, chiefly during the early years of their mental development, an advance over their less fortunate fellows. This innate capacity we have called *Brightness*. That is, the greater the capacity for mental development, or the greater the potential development, the greater the degree of brightness. A child who exceeds just one half of the children of his age in Mental Ability and whose score is therefore just equal to the norm for that age is considered just *normal*. If a pupil obtains a score which is 25 points above the norm for his age, we may say that he has an *Increment of Score* of 25 points; if his score falls short of the norm by 15 points, we may say that he has a *Decrement of Score* of 15 points. Either the Increment of Score or the Decrement of Score is a *Deviation from the Norm*. Those who exceed more than half of the children of their own age and who consequently have an Increment of Score are therefore brighter than normal, and those who exceed less than half and have a Decrement of Score are duller than normal. Broadly speaking, however, the term " normal " is used to characterize all those who fall within the middle half of the group as distributed on the scale of brightness. Usually only those who fall in the upper quarter are termed bright and only those who fall in the lower quarter are termed dull.

TABLE 5

The Binet Mental Age Corresponding to Each Score in the Advanced Examination

Tens of Score		20	30	40	50	60	70	80	90	100	110
Units of Score	0		8 : 4	9 : 0	9 : 8	10 : 5	11 : 2	12 : 0	13 : 0	13 : 11	14 : 10
	1		8 : 5	9 : 1	9 : 9	10 : 6	11 : 3	12 : 1	13 : 1	14 : 0	14 : 11
	2		8 : 6	9 : 2	9 : 10	10 : 7	11 : 4	12 : 2	13 : 2	14 : 1	15 : 0
	3		8 : 7	9 : 3	9 : 11	10 : 8	11 : 5	12 : 3	13 : 3	14 : 2	15 : 1
	4		8 : 7	9 : 3	9 : 11	10 : 9	11 : 6	12 : 4	13 : 4	14 : 3	15 : 2
	5	8 : 0	8 : 8	9 : 4	10 : 0	10 : 10	11 : 7	12 : 6	13 : 6	14 : 5	15 : 3
	6	8 : 1	8 : 9	9 : 5	10 : 1	10 : 11	11 : 8	12 : 7	13 : 7	14 : 6	15 : 4
	7	8 : 2	8 : 10	9 : 6	10 : 2	10 : 11	11 : 9	12 : 8	13 : 8	14 : 7	15 : 5
	8	8 : 3	8 : 11	9 : 7	10 : 3	11 : 0	11 : 10	12 : 9	13 : 9	14 : 8	15 : 6
	9	8 : 3	8 : 11	9 : 7	10 : 4	11 : 1	11 : 11	12 : 10	13 : 10	14 : 9	15 : 7

Tens of Score		120	130	140	150	160	170	180	190	200
Units of Score	0	15 : 8	16 : 4	17 : 0	17 : 6	18 : 0	18 : 6	18 : 11	19 : 2	19 : 6
	1	15 : 8	16 : 5	17 : 1	17 : 7	18 : 1	18 : 6	18 : 11	19 : 3	
	2	15 : 9	16 : 6	17 : 1	17 : 7	18 : 1	18 : 7	19 : 0	19 : 3	
	3	15 : 10	16 : 7	17 : 2	17 : 8	18 : 2	18 : 8	19 : 0	19 : 3	
	4	15 : 11	16 : 8	17 : 3	17 : 9	18 : 3	18 : 8	19 : 0	19 : 4	
	5	16 : 0	16 : 8	17 : 3	17 : 9	18 : 3	18 : 9	19 : 1	19 : 4	
	6	16 : 1	16 : 9	17 : 4	17 : 10	18 : 4	18 : 9	19 : 1	19 : 4	
	7	16 : 2	16 : 10	17 : 5	17 : 11	18 : 4	18 : 10	19 : 1	19 : 5	
	8	16 : 3	16 : 11	17 : 5	17 : 11	18 : 5	18 : 10	19 : 2	19 : 5	
	9	16 : 4	16 : 11	17 : 6	18 : 0	18 : 5	18 : 11	19 : 2	19 : 5	

Percentile Rank

A pupil who exceeds just 50 per cent of the children of his age in Intelligence is said to have a *Percentile Rank* (PR) of 50. One who exceeds just 75 per cent of the children of his age in Intelligence is said to have a Percentile Rank of 75, etc. It may be seen, therefore, that the range of Percentile Ranks is from 0 to 100. A PR of 50 means exact normality, etc.

Now it is accepted as a fundamental fact that in most cases a child who is above Normal at one age will be above Normal at all ages, and a child who is below Normal will always be below Normal. Moreover, the degree of brightness of an individual is expected to remain approximately constant. Were this not so, prognostication would be impossible. Intelligence measurement would be of little value.[1]

This means that if a 10-year child exceeds just 50 per cent of 10-year-olds in Mental Ability, — being therefore a Normal child, — he will be expected to exceed approximately 50 per cent of children of his age at any later time and hence, when an adult, to exceed 50 per cent of adults in Mental Ability. That is, he maintains a constant Percentile Rank of 50. Similarly, a 10-year child who exceeds 75 per cent of 10-year-olds in Mental Ability will be expected to exceed 75 per cent of children of his age at any later time and hence ultimately to exceed in Mental Ability 75 per cent of adults, etc. That is, an individual's Percentile Rank is assumed to remain approximately constant. The Percentile Rank of an individual, therefore, is another measure of his degree of brightness. (See Table 6 for the percentile rank corresponding to each intelligence quotient.)

Directions for Finding an IQ

In view of the desire on the part of a number of examiners to express the measures of brightness of their pupils in terms of Intelligence Quotient, Table 6 is provided.

The " IQ " of a pupil found from this table is not the same as would be obtained by dividing his mental age obtained from Table 4 by his chronological age, but is, nevertheless, more nearly equal to the IQ that would be obtained from the Binet-Simon Tests than an IQ found as above.

To find the IQ of a pupil, find the difference between his score and the norm for his age. (Norms are given in Table 4.) Call this difference the " Deviation of Score " (DS). Find the IQ corresponding to this Deviation of Score in Table 6.

The table is read as follows: If a pupil whose age last birthday was 8 years made a score 0 points or 1 point higher or lower than the norm for his age, his IQ is 100 and he exceeds 50 per cent of pupils of his age in mental ability. If his score is 2 or 3 points above the norm for his age, his IQ is 101 and he exceeds 53 per cent of pupils of his age in mental ability. If his score is 2 or 3 points below the norm for his age, his IQ is 99 and he exceeds 47 per cent of pupils of his age in mental ability, etc.

[1] Exceptions to this rule are noted in certain special instances, particularly in the case of feeble-minded persons.

TABLE 6[2]

For Finding the Binet IQ by the Advanced Examination

Deviation of Score — Age Last Birthday				Plus Deviation		Minus Deviation	
8 Years	9 Years	10 Years	11 Years or over	IQ	PR	IQ	PR
0–1	0–1	0–1	0	100	50	100	50
2–3	2–3	2–3	1–3	101	53	99	47
4–5	4–5	4–6	4–6	102	57	98	43
6–7	6–8	7–9	7–9	103	60	97	40
8–9	9–10	10–11	10–12	104	63	96	37
10–11	11–13	12–14	13–15	105	66	95	34
12–13	14–15	15–17	16–18	106	69	94	31
14–15	16–17	18–19	19–21	107	72	93	28
16–18	18–20	20–22	22–24	108	75	92	25
19–20	21–22	23–24	25–27	109	77.5	91	22.5
21–22	23–24	25–27	28–30	110	80	90	20
23–24	25–27	28–30	31–33	111	82	89	18
25–26	28–29	31–32	34–36	112	84	88	16
27–28	30–32	33–35	37–39	113	86	87	14
29–30	33–34	36–38	40–42	114	88	86	12
31–32	35–36	39–40	43–45	115	89	85	11
33–35	37–39	41–43	46–48	116	91.1	84	8.9
36–37	40–41	44–45	49–51	117	92.4	83	7.6
38–39	42–43	46–48	52–54	118	93.55	82	6.45
40–41	44–46	49–51	55–57	119	94.4	81	5.6
42–43	47–48	52–53	58–60	120	95.4	80	4.6
44–45	49–51	54–56	61–63	121	96.1	79	3.9
46–47	52–53	57–59	64–66	122	96.8	78	3.2
48–49	54–55	60–61	67–69	123	97.3	77	2.7
50–52	56–58	62–64	70–72	124	97.8	76	2.2
53–54	59–60	65–66	73–75	125	98.2	75	1.8
55–56	61–62	67–69	76–78	126	98.58	74	1.42
57–58	63–65	70–72	79–81	127	98.84	73	1.16
59–60	66–67	73–74	82–84	128	99.09	72	.91
61–62	68–70	75–77	85–87	129	99.27	71	.73
63–64	71–72	78–80	88–90	130	99.43	70	.57
65–66	73–74	81–82	91–93	131	99.54	69	.46
67–69	75–77	83–85	94–96	132	99.65	68	.35
70–71	78–79	86–87	97–99	133	99.72	67	.28
72–73	80–81	88–90	100–102	134	99.79	66	.21
74–75	82–84	91–93	103–105	135	99.84	65	.16
76–77	85–86	94–95	106–108	136	99.88	64	.12
78–79	87–89	96–98	109–111	137	99.90	63	.10
80–81	90–91	99–101	112–114	138	99.93	62	.07
82–83	92–93	102–103	115–117	139	99.95	61	.05
84–86	94–96	104–106	118–120	140	99.96	60	.04
87–88	97–98	107–108	121–123	141		59	
89–90	99–100	109–111	124–126	142		58	
91–92	101–103	112–114	127–129	143		57	
93–94	104–105	115–116	130–132	144		56	
95–96	106–108	117–119	133–135	145		55	
97–98	109–110	120–122	136–138	146		54	
99–100	111–112	123–124	139–141	147		53	
101–103	113–115	125–127	142–144	148		52	
104–105	116–117	128–129	145–147	149		51	
106–107	118–119	130–132	148–150	150		50	
108–109	120–122	133–135	151–153	151		49	
110–111	123–124	136–137	154–156	152		48	
112–113	125–127	138–140	157–159	153		47	
114–115	128–129	141–143	160–162	154		46	
116–117	130–131	144–145	163–165	155		45	
118–120	132–134	146–148	166–168	156		44	

[2] Dr. L. M. Terman, author of the Stanford Revision of the Binet-Simon Intelligence Scale, has stated that the semi-interquartile range of the distribution of IQ's obtained by this test is 8 points (*The Measurement of Intelligence*, pages 78 ff., Houghton Mifflin Company, 1916). That is, a pupil who exceeds 75 per cent of pupils of his age in mental ability obtains an IQ of 108. Therefore, Table 6 has been constructed so that any pupil whose score exceeds the scores of 75 per cent of pupils of his age will obtain an IQ of 108. Consequently, of course, the percentile rank corresponding to the IQ of 108 is necessarily 75. The other IQ's and percentile ranks in the table were worked out on this basis.

VI. USES OF INTELLIGENCE TESTS

A comprehensive presentation of the uses of intelligence tests will be found in Dickson's *Mental Tests and the Classroom Teacher* (World Book Company). Some of these purposes are enumerated here.

Classification. The pupils in any class or school fall into three general types: (1) the average pupils, to whom the work and organization of the school are best fitted and who do fairly well; (2) the dull, who are slow in learning and have difficulty in understanding, and who are usually pushed ahead in the grades because of size or age; and (3) the bright, who learn quickly and easily and much of whose time during the day is, for that reason, necessarily unoccupied by school work.

In general the dull pupil is dull in all his work, the bright pupil is uniformly bright, and the average is uniformly average, although marked exceptions to this rule do appear. The work of the schools will then be most effective if it is determined in which of the three groups each pupil falls and if the work is adapted to the abilities of the pupils in each group. The duller pupils must be expected to learn more slowly and to require more simple and thorough presentation. The bright pupils learn so quickly that an enriched curriculum must be provided for them so that all their time in school will be occupied with activities of educational value to them. It is to these exceptional children that the nation must look for the creative genius and leadership by means of which society can evolve a greater civilization.

Perhaps the chief value of intelligence measurement, then, is the scientific (as well as rapid and accurate) classification of pupils in regard to their native capacities to learn, in order to provide for the separate teaching of pupils who differ markedly in ability to progress in school.

Feeble-minded and gifted. At one extreme there are found pupils in schools who are not able to profit from school work in the usual school organization. The more serious cases should be placed in institutions for the feeble-minded. The less serious cases should be placed in special classes.

At the other extreme there are found the exceptionally brilliant pupils who are not challenged to an appreciable degree by the usual school work. They too should be segregated, so that they will be in classes with pupils like themselves and provided with a specially enriched curriculum that will develop to the greatest possible extent their superior mental abilities and their possibilities for social and physical development.

Vocational guidance. Intelligence tests can be used to determine roughly the level of the vocation that a pupil may safely strive to prepare for. For example, it is known that for success in the professions — medicine, law, engineering, etc. — a high degree of general ability is required. On the other hand, for unskilled labor a fairly low level of general ability ordinarily suffices. For more precise guidance special tests, aptitude tests, must be used. Whether a particular boy or girl should prepare for one vocation or another depends on his tastes and temperament, his previous experience, his special aptitudes as a result of the foregoing, his financial resources, immediate opportunities, etc. When these and his intelligence rating are known, vocational guidance becomes not a matter of measurement, but of judgment.

Problem pupils. Much light can be thrown on the reason for delinquency or other types of problems existing among school children, by their intelligence ratings. For this purpose the services of a trained psychologist must be obtained. Many school systems employ psychologists and visiting teachers to study and correct problem cases. The intelligence test is an important part of their technique.

Intelligence tests can also be used to advantage in penal institutions and in criminal cases, since among criminals a much larger percentage are feeble-minded than the percentage of feeble-minded in the population at large. Such tests will help in understanding the criminal better and in making more just and suitable the punishment or correction to be applied.

Validity of the Otis Group Intelligence Scale. For a discussion of the validity of the scale as a measure of that which we have called general mental ability, the reader is referred to Otis, A.S., "An Absolute Point Scale for the Measurement of Intelligence," *Journal of Educational Psychology*, May and June, 1918, and Terman, L. M., *The Measurement of Intelligence* (Houghton Mifflin Company, Boston, Massachusetts).

TABLE 7

SHOWING THE DISTRIBUTIONS OF SCORES IN THE ADVANCED EXAMINATION FOR AGE GROUPS EIGHT TO NINETEEN. BASED UPON 25,226 UNSELECTED PUPILS FROM 200 CITIES. DISTRIBUTIONS AUGMENTED

Scores		0 TO 9	10 TO 19	20 TO 29	30 TO 39	40 TO 49	50 TO 59	60 TO 69	70 TO 79	80 TO 89	90 TO 99	100 TO 109	110 TO 119	120 TO 129	130 TO 139	140 TO 149	150 TO 159	160 TO 169	170 TO 179	180 TO 189	190 TO 199	200 TO 209	210 TO 219	Totals
Grade	Age																							
8 : 0	4	20	40	95	95	110	90	80	60	55	20	10	5	5										685
to	5	7	2		2		7	7	5			5												35
8 : 11	Totals	27	42	95	97	110	97	87	65	55	20	15	5	5										720
	4	40	160	315	344	393	359	377	298	189	115	25	20	10	10									2655
9 : 0	5		5	7	12	39	60	60	67	39	41	18	25	18		2								393
to	6						3	3	3	8	3	2			2									24
9 : 11	7									1														1
	Totals	40	165	322	356	432	422	440	368	237	159	45	45	28	12	2								3073
	4	45	214	363	314	333	269	199	125	45	35	20	10											1972
10 : 0	5	2	14	25	127	208	282	313	282	270	243	143	60	42	21	9	2	2						2045
to	6			2	5	8	33	20	50	76	58	56	36	19	11	8	8							390
10 : 11	7						1	1	2	3	6	10	4	4	6									37
	8															1								1
	Totals	47	228	390	446	549	585	533	459	394	342	229	110	65	38	18	10	2						4445
	4	10	85	224	239	209	110	95	75	20	5	5												1077
	5	5	21	90	172	270	383	305	303	232	120	92	58	18	7									2076
11 : 0	6				17	42	108	201	265	353	322	282	224	157	75	47	12	5						2110
to	7				1	7	7	16	43	56	82	106	79	59	46	26	16	7						551
11 : 11	8						2		2	4	8	5	5	7	14	5	4	2		1				59
	9												1	1	1		2	1						6
	Totals	15	106	314	429	528	610	617	688	665	537	490	367	242	143	78	34	15		1				5879
	4	20	50	115	120	95	90	50	25		10													575
	5		21	71	162	238	215	206	179	154	51	21	18	2	5									1343
	6			6	25	82	159	262	325	389	317	268	201	96	57	19	11	3		2				2222
12 : 0	7		1	4	4	7	37	113	166	300	282	275	264	179	116	53	30	10	6	1				1848
to	8					1	3	7	12	26	54	70	96	81	71	57	30	21	6	3				538
12 : 11	9							1		3	8	11	14	11	17	15	16	5	4					105
	10											1	2	4	2	4	2		1	1				17
	Totals	20	72	196	311	423	504	639	707	872	722	646	595	373	268	148	89	39	17	7				6648
	4	25	15	85	70	65	45	10	15															330
	5		16	35	62	127	161	148	110	44	23	9	5											740
	6			3	25	65	127	163	244	207	143	117	51	23	5	5								1178
13 : 0	7			4	6	23	63	122	199	275	284	265	202	142	75	40	12	3						1715
to	8			1	1	5	5	26	69	134	204	239	288	228	222	121	91	36	16	2	2			1690
13 : 11	9						1	7	7	23	35	66	86	95	132	105	82	49	9	8	2			707
	10										5	7	12	22	24	19	18	7	2					116
	11																	1						1
	Totals	25	31	128	164	285	402	476	644	683	694	703	644	510	458	290	203	96	27	10	4			6477
	4		30	5	50	20	10	5																120
	5		7	18	41	60	78	42	25	14	9	2	5											301
	6		3	9	34	37	67	93	98	78	48	47	20	3	2	2								541
	7		1	6	9	32	56	107	126	158	178	148	102	60	30	12	3							1028
14 : 0	8			1	2	6	20	48	78	148	200	233	243	176	124	70	49	20	6	2				1426
to	9						3	6	19	54	99	155	205	232	215	160	129	78	31	7	4			1397
14 : 11	10						1		1	9	10	25	47	55	65	90	57	58	24	8	6			456
	11											1	1	2	5	3	7	2	5	5	4			35
	12																1	1			1			3
	Totals		41	39	136	155	235	301	347	461	544	611	623	528	441	337	246	159	66	22	15			5307
	4	5	10	15	5	5		5	5															50
	5		9	11	12	21	12	16	12	7	2	2												104
	6		2	6	9	22	17	33	31	26	19	5	5	2										177
	7		1	1	12	9	33	37	41	62	59	39	24	16	11									345
15 : 0	8			2	1	4	12	29	58	85	97	114	104	74	40	29	10	8	1	1	1			670
to	9						1	14	26	68	77	145	149	143	130	89	67	39	10	6	3			967
15 : 11	10							4	8	14	34	46	93	135	137	133	98	73	45	19	2			841
	11										3	1	12	12	25	48	21	27	25	27	7	3		211
	12													1	3	1	3	5	4	4	3	2		26
	Totals	5	22	35	39	61	75	138	181	262	291	352	387	383	346	300	199	152	85	57	16	5		3391
	4			10			5																	15
	5					2	7	2		2														13
	6			3		3	3	6	8	8	2													33
	7				3	1	6	10	4	9	4	2	1	1										41
16 : 0	8				1	2	9	13	20	18	29	30	19	16	10	3	1	2	1					174
to	9						3	8	16	20	33	54	60	60	47	34	21	12	7	1	1			377
16 : 11	10							1	7	17	25	38	83	80	110	89	70	47	19	9	1			596
	11						1		2	3	10	19	23	59	63	79	83	92	51	40	32	1		558
	12										1		2	4	18	24	21	30	23	17	19	5		164
	Totals			13	4	8	34	40	57	77	104	143	188	220	248	229	196	183	101	67	53	6		1971
	6									2														2
	7							3	1	1		4												9
	8							2	2	6	4	3	5	3	4	1								30
17 : 0	9						1	4	7	7	13	13	13	4	9	9	3	6		1				90
to	10						1	2	9	4	17	19	38	32	30	29	26	14	7	4	1			233
17 : 11	11								1		9	23	42	53	60	75	69	63	40	29	10	1		475
	12										2	12	20	25	50	53	69	69	53	32	19	4	1	409
	Totals						2	11	20	20	45	74	118	117	153	167	167	152	100	66	30	5	1	1248
	6					2		2																4
	7							1	1		1													3
	8						2	1	1		2	1												7
18 : 0	9								3	1		6	1	4	3	1		1	1					21
to	10									2	3	6	7	9	8	6	6	3	2	1				53
18 : 11	11							1	1	6	7	10	12	18	21	23	28	20	10	6	7	4	1	175
	12									4	7	15	19	32	49	70	71	54	44	18	4	1		388
	Totals					2	2	5	6	13	20	38	39	63	81	100	105	78	57	25	11	5	1	651
	8									2														2
19 : 0	9								1			1			2	1	1	1		1				8
to	10											3		1	4	3		2		1				14
19 : 11	11									13	6		7	3	6		10	7	3	4	2	1		62
	12									1	9	8	13	22	20	25	15	22	11	14	3	1		164
	Totals								1	16	15	12	20	26	32	29	26	32	14	20	5	2		150
20 or over																								89
																							Grand Total	40,149

DETROIT KINDERGARTEN TEST

Individual

By Harry J. Baker, Clinician, and H. J. Kaufmann, Statistician,
Detroit Public Schools

EXAMINATION: FORM A

School . . . . . .

Date of test . . . . . .

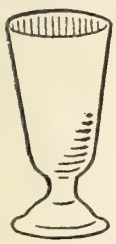
Name . . . . . .

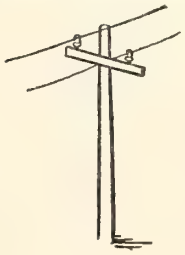
Age . . . . . .

TEST RECORD

No. Test	Score
1	
2	
3	
4	
5	
6	
7	
8	
Total	

Test 1





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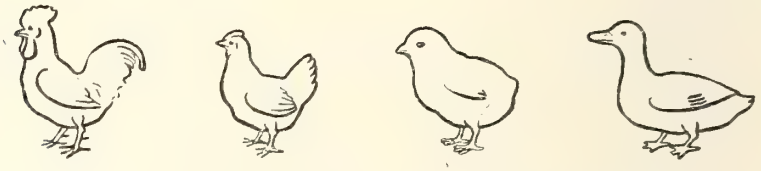

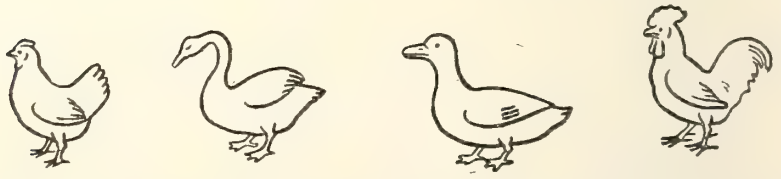

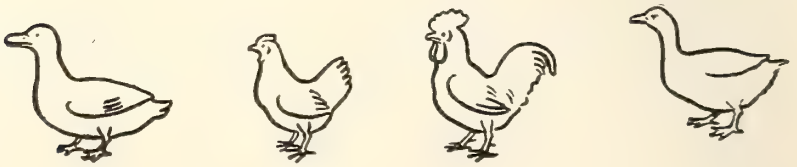

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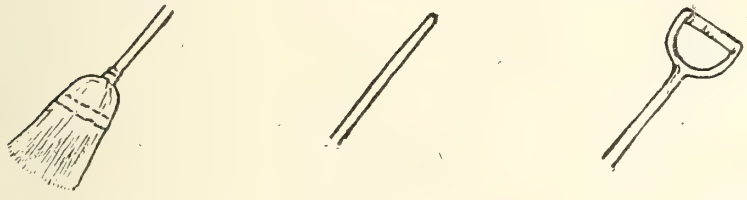

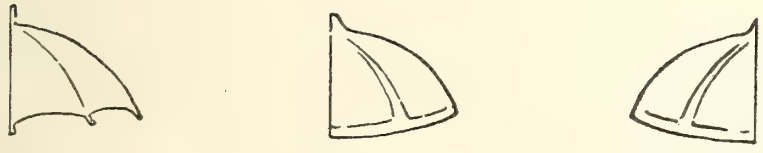

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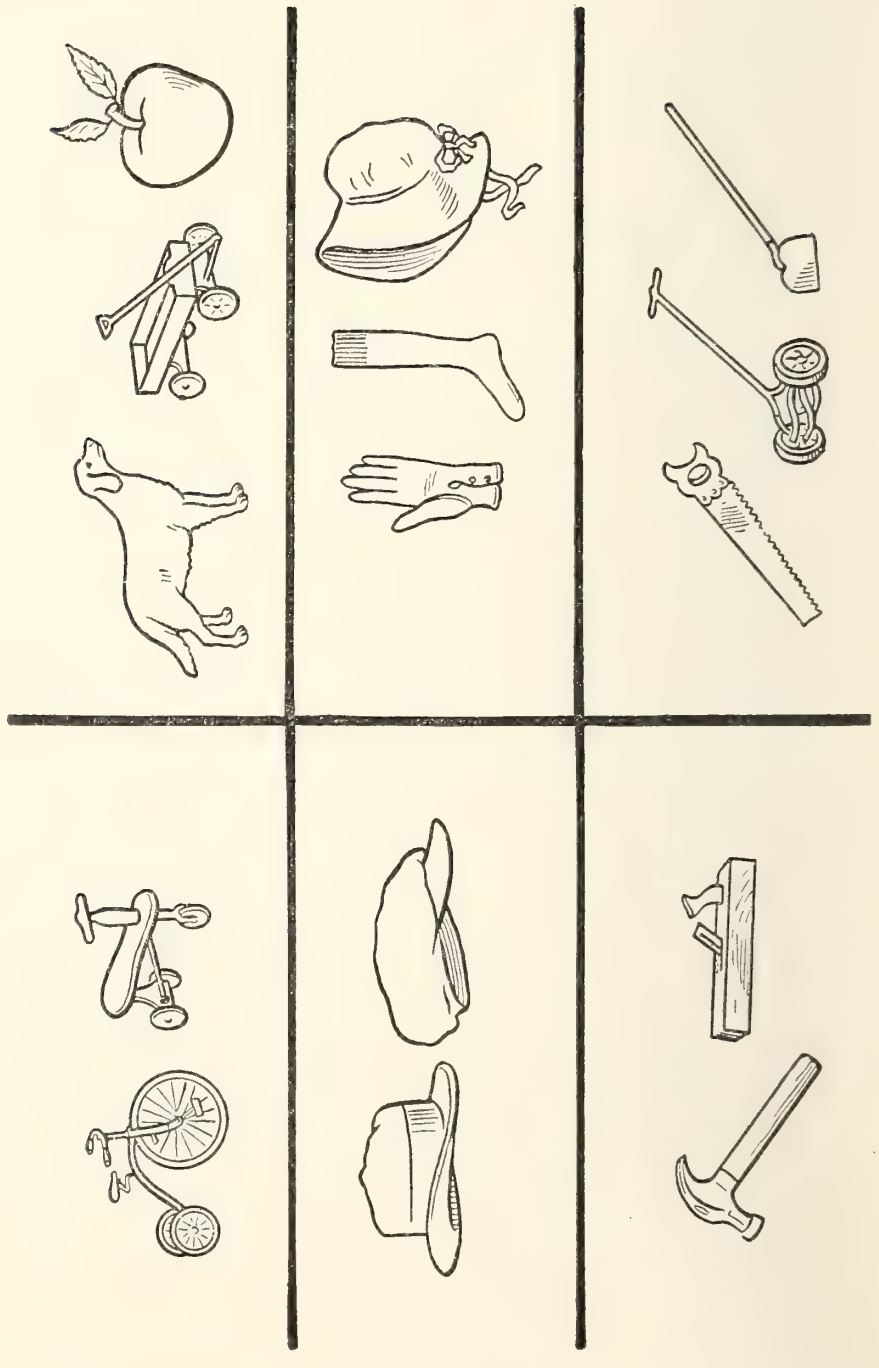

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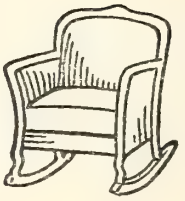
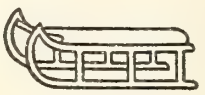
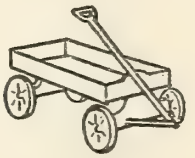
Test 6



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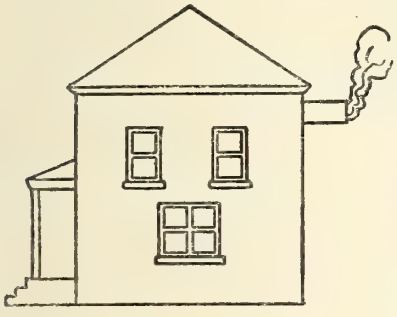
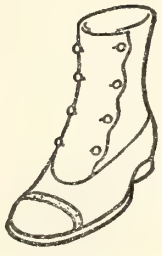
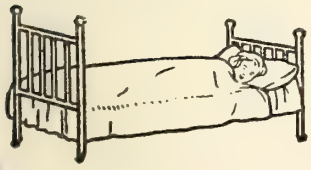
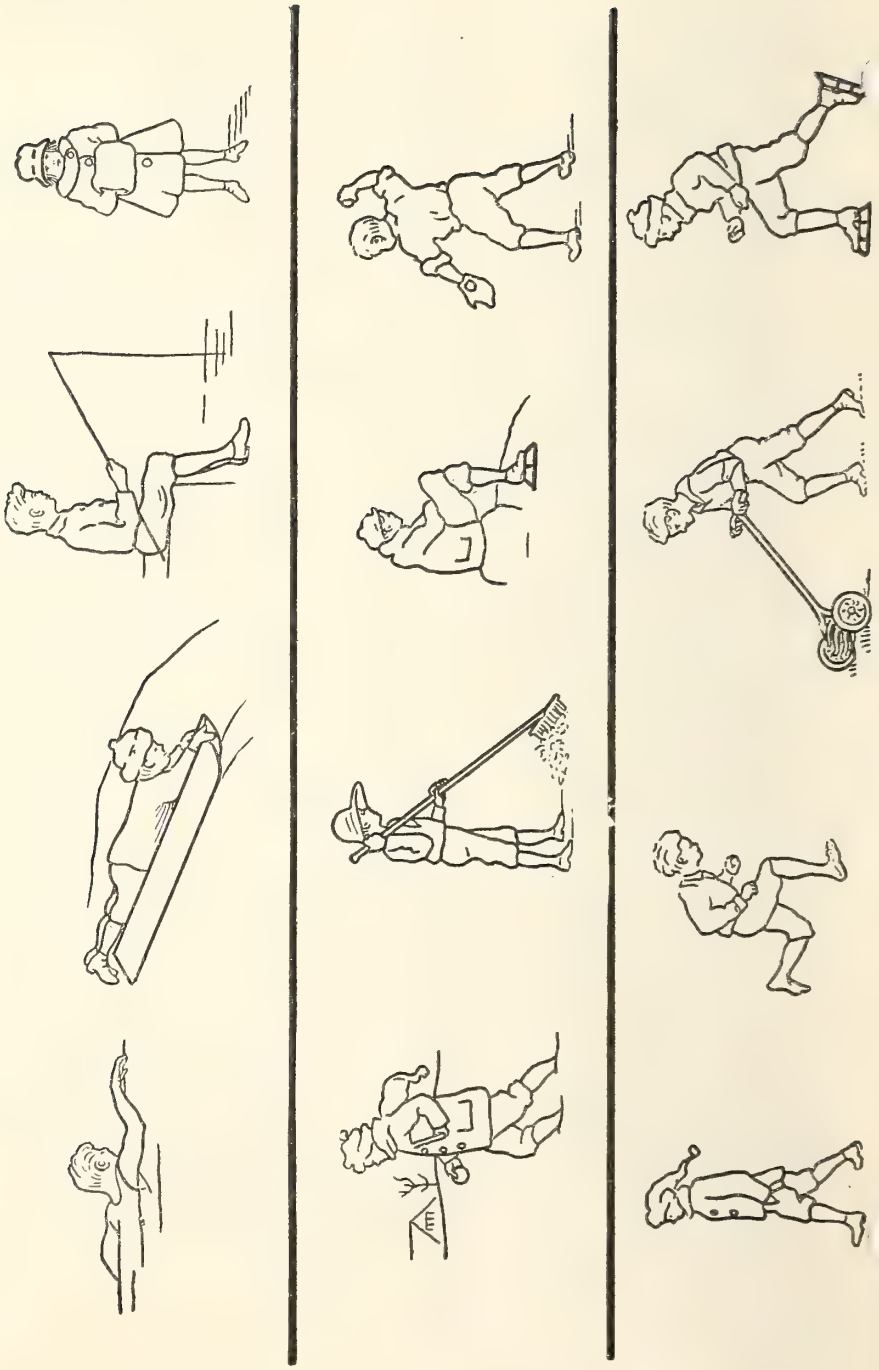






Test 8



HERRING REVISION

OF THE

BINET-SIMON TESTS

By JOHN P. HERRING

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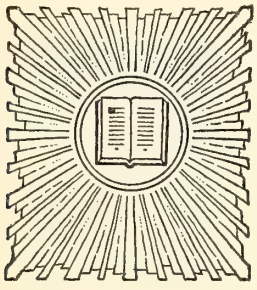

SPECIMEN PAGES

THE HERRING REVISION of the Binet-Simon Tests is an individual examination of mental ability based on the original Binet-Simon Scale. Though the character of most of the questions is similar to the tests in the original scale and its revisions, the substance of the tests is entirely new. The author has eliminated many disadvantages of previous revisions and retained the advantages. In addition, many new features are introduced which render the administration much more simple and rapid than that of previous revisions.

This revision contains in reality five examinations of different lengths as pointed out on page 4 of the Examination Manual reproduced herein. This arrangement makes provision for giving the examination in any desired length, from a rapid survey examination to a complete and accurate examination for diagnostic purposes. In the following pages the shortest test, designated Group A, is reproduced, with the exception of three of the pictures of Test 1.

Mental ages and intelligence quotients by the Herring Revision have exactly the same significance as those by the Stanford Revision. Comparison of measures by the two scales is simple and valid. The probable error of a mental age is not far from 2.5 months, and of an I.Q. not far from 2.5 points. The mental age by Group C, which can be administered in 30 minutes, is more reliable than the combined scores of several group tests.

All of the material for the test is included in one manual. The following pages show how the convenient arrangement on the page makes for simplicity in administering. An Individual Record Card, which appears in reduced size on the last page of this pamphlet, is used for recording the responses of each examinee.

Examination Manual: Form A. Cloth. 56 pages. Price $1.00 net.

Individual Record Card. 2 pages, 8½ x 11 inches. Price per package of 25 cards $1.00 net.

WORLD BOOK COMPANY
Publishers of many standard tests
YONKERS-ON-HUDSON, NEW YORK
2126 PRAIRIE AVENUE, CHICAGO
Boston, Dallas, Atlanta, San Francisco, Portland, and Manila

CONTENTS

PAGE

Introductory 3
Nature of the Examination 3
Directions for Administering 4
Directions for Scoring 5
Directions for Recording 6
Tests [1] 7–51

	PAGE		PAGE
1. Interpretation of Pictures.	7	20. Reproduction of Thought.	32
2. Number Series Completion	16	21. Mixed Sentences	33
3. Reproduction of Thought.	17	22. Problem Reading	34
4. Digits Backward	18	23. Repetition of Syllables	36
5. Parts of Body	20	24. Following Directions	36
6. Repetition of Syllables	20	25. Following Directions	38
7. Size Comparisons	21	26. Similarities	39
8. Æsthetic Discrimination	22	27. Generalization	40
9. Naming Colors	24	28. Comprehension	41
10. Problematic Situations	24	29. Sentence Completion	42
11. Reproduction of Thought.	25	30. Problem Reading	43
12. Definition of Abstract Words	25	31. Naming Objects	45
13. Reproduction of Thought.	26	32. Form Comparison	47
14. Problematic Situations	28	33. Commissions	48
15. Absurdities	29	34. News Route	48
16. Sentence Building	30	35. Digits Forward	49
17. Rhymes	30	36. Repetition of Syllables	49
18. Similarities	31	37. Roast	50
19. Proverbs	31	38. Code	51

Standardized Answers 53–56

[1] These test titles do not indicate at all what psychological functions are tested; indeed, many of them are definitely misleading in this particular. They have been selected as a convenient means of designating the different tests. Their significance, in the mind of the examiner, should be confined to this function.

HRBST:EM:A–1

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EXAMINATION MANUAL: FORM A

INTRODUCTORY

MEASUREMENT of the results of teaching is a widespread practice, but this measurement by itself is insufficient, because, while it tells how well a child is doing in arithmetic, reading, and other school subjects, it does not tell how well he can do. We need to know both things. Educational examinations tell us how much a child has accomplished; intelligence examinations tell us how much a child can accomplish. The difference between the two is the child's unused margin of ability. It is not difficult to measure this margin of unused ability, but it can no more be measured without an intelligence examination, than it can without educational examinations. Hence the importance of obtaining both measures.

It would be shameful to allow another generation of children to pass through school unmeasured; with so many children and so few psychologists, teachers will have to accomplish this measurement. Public school teachers are as able to use individual examinations like the Herring-Binet, as they are to teach reading, and, if we consider merely the process of obtaining mental ages, certainly more so. See Terman, *Intelligence of School Children*, Chapter XIII, "Practical Suggestions for the Use of Mental Tests."

NATURE OF THE EXAMINATION

The Herring Revision of the Binet-Simon Tests is an individual examination for the purpose of measuring mental ability. The questions are asked and, for the most part, answered orally. The examination contains many tests similar to those in the Binet-Simon Tests, such as repeating digits, detecting similarities, interpreting pictures, etc. The final score in the examination is expressed, as is that of the Binet-Simon Tests, as a mental age. The mental age by the Herring Revision of the Binet-Simon Tests has the same meaning and significance as the mental age by the Stanford Revision of the Binet-Simon Tests.

The examination consists of thirty-eight tests. Each test consists of a short series of elements. A score in the examination as a whole is the sum of the scores obtained for the separate tests.

Provision is made also for obtaining the mental age by the use of fewer than the thirty-eight tests which constitute the complete examination. Thus, a mental age may be obtained by administering:

Tests 1 to 4, called Group A,
Tests 1 to 13, called Group B,
Tests 1 to 22, called Group C,
Tests 1 to 31, called Group D, or
Tests 1 to 38, called Group E.

A table is given showing the mental age equivalents of each total score.

DIRECTIONS FOR ADMINISTERING

It is indispensable to know and to master painstakingly and in detail the defined procedure, and to allow oneself no exceptions. For examiners who cannot trust their verbal memories, it is better to become very familiar with the words and then to read them to each subject.

Before beginning to use the examination, read it over with close attention; administer it to some friend; or better, to some child whose mental age is already known; then study further the detail of the procedure, instructions, and scoring; then administer the examination to another examinee; study the details again and repeat. Follow instructions exactly and do nothing not required. Never vary the wording. If a child does not understand, do not simplify or explain except as specified in the instructions. Everything that is said to the child is printed in black-face type. Although the words should be spoken by the examiner verbatim, they should not be read in an unnatural manner. The rate should be not far from three words per second.

Give no help to children during, before, or after an examination. Never allow children to become familiar with the tests except so far as this cannot be avoided in their use. Give the examination as if it were nothing unusual. Do not make any child feel that promotion or demotion may result. Win the confidence of each child. If the examination cannot be given under circumstances in which the child responds without restraint or embarrassment, postpone it. A knowledge of other general rules for using individual intelligence examinations may be readily acquired from Terman's *Measurement of Intelligence.*

Test 1. Interpretation of Pictures

"What is this picture about?"

Repeat the question each time if necessary. If there is no response, or if the response is unsatisfactory, say, **"Tell me what you see in this picture."**

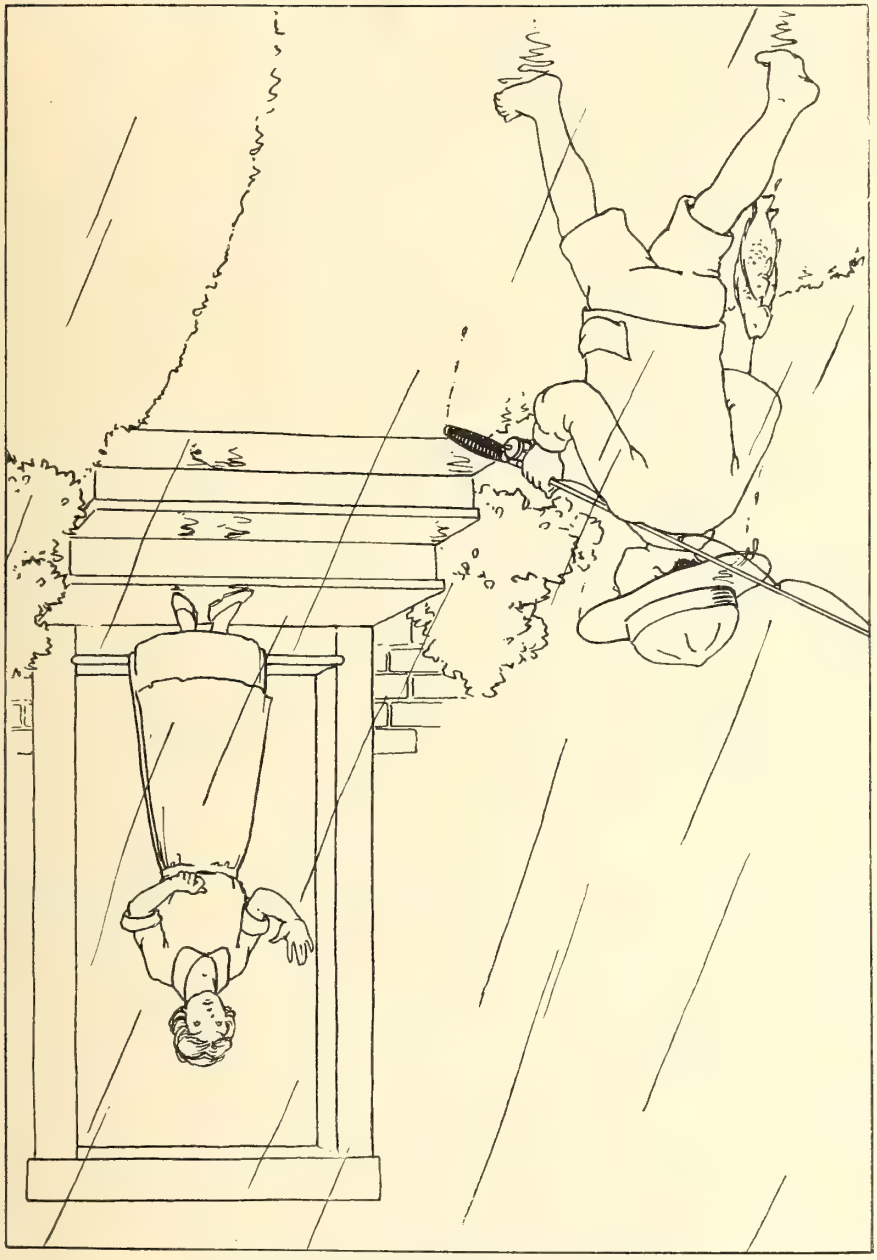
Score: Credit for each picture 1, 2, or 3 points according to the nature of the response, as follows. Credit

1 point if examinee enumerates merely,

2 points if any part of the response is clearly on the descriptive level,

3 points if any part of the response is clearly on the level of interpretation. (*See Standardized Answers.*)

Score: Sum of points credited in four pictures.
Maximum score: 12.



(Note: There are three other pictures for this test.)

a. 9 8 7 6 — —

b. 40 30 20 — —

c. 4 8 16 32 — —

d. 3 4 5 2 3 4 1 2 3 — — —

e. 9 9 7 7 7 5 5 — —

f. 4 3 5 4 6 5 — —

g. 1 3 7 15 — —

h. 0 2 8 26 — —

Test 2. Number Series Completion

"In the first row of numbers tell me what *two numbers* should come next,—*here* and *here*. Go ahead."

"The next row." Etc.

See Key, page 19.
Score: Number of rows correctly completed.
Maximum score: 8.

Last winter a large river overflowed its banks near a small town. The water covered the streets and entered many of the houses. Fourteen persons were drowned. At least fifty persons caught colds because of the dampness and the cold weather.

Test 3. Reproduction of Thought

1. Last winter
2. a large river
3. overflowed its banks
4. near a small town.
5. The water covered the streets
6. and entered many of the houses.
7. Fourteen persons
8. were drowned.
9. At least
10. fifty persons
11. caught colds
12. because of the dampness
13. and the cold weather.

"Read this to yourself. Then begin at the beginning and tell me everything you have read."

If necessary, say, after the examinee has read the selection, **"Tell me everything you have read."** In all tests entitled "Reproduction of Thought," if the important idea of a numbered passage is reproduced, credit that passage even though the language is changed. In elements 7 and 10, the numbers fourteen and fifty must be exactly reproduced.

Score: Number of elements credited.
Maximum score: 13.

Test 4. Digits Backward

"I am going to read some numbers. When I am *through* say the numbers *backward*. If I say 9, 2, you say 2, 9. Do you understand?"

Read the digits at the rate of one digit per second. Repeat no series.

(2) 2, 8 6, 9 4, 3

(3) 1, 9, 4 3, 1, 8 6, 8, 5

(4) 5, 4, 1, 7 4, 8, 2, 7 2, 5, 3, 8

(5) 4, 5, 8, 3, 6 3, 7, 2, 9, 4 3, 6, 2, 9, 7

(6) 3, 6, 9, 8, 4, 1 4, 7, 2, 1, 8, 3 6, 4, 1, 5, 2, 7

(7) 5, 3, 9, 6, 2, 8, 4 3, 6, 1, 4, 7, 2, 5
5, 3, 9, 4, 1, 8, 6

(8) 6, 1, 4, 2, 3, 7, 8, 5 3, 8, 7, 4, 2, 6, 5, 1
7, 2, 6, 8, 4, 3, 7, 1

(9) 7, 2, 5, 3, 4, 8, 9, 6, 8 4, 9, 8, 5, 3, 7, 6, 2, 5
6, 1, 5, 7, 4, 2, 8, 3, 9

On each level there are three series of digits. Give only as many series on each level as are necessary to get one correct repetition. Stop with the first level on which no series is correctly repeated.

Score: Number of digits in longest successful series.
Maximum score: 9.

MENTAL AGE EQUIVALENTS FOR GROUP A

POINTS	M. A.	POINTS	M. A.	POINTS	M. A.	POINTS	M. A.	POINTS	M. A.
5	74	12	87	19	111	26	149	33	192
6	75	13	90	20	115	27	155	34	198
7	77	14	93	21	120	28	160	35	204
8	78	15	96	22	125	29	166	36	210
9	80	16	100	23	131	30	172	37	216
10	82	17	103	24	137	31	179	38	222
11	84	18	106	25	143	32	185	39	228

PROCEDURE FOR GROUP B

Group B consists of Group A and nine additional tests. It has a higher correlation with intelligence than Group A, and requires but little more time. The examinee's score in Group A is a very reliable index of his performance in some of the tests of Group B. The following table tells what tests of Group B are to be credited *but not given:*

Score in Group A	Credit in full but do not give Tests:	Total credit for these tests
10 to 15	5, 6	7
16 to 19	5, 6, 7	10
20 to 25	5, 6, 7, 8	14
26 to 41	5, 6, 7, 8, 9	17
42	5, 6, 7, 8, 9, 10	23

If the examinee scores 5 points or less in Group A, omit and *do not credit* Tests 12 and 13.

If the examinee scores 22 points or less in Group A, omit and *do not credit* Test 13.

Key for Test 2

a. 5, 4
b. 10, 0
c. 64, 128
d. 0, 1
e. 5, 3
f. 7, 6 or 4, 9
g. 31, 63
h. 80, 242

The Individual Record Card is here shown greatly reduced. The size of the card is 8½ x 11 inches, and it is printed on both sides, the reverse to be used for recording responses to certain tests. Results on the test are recorded as the examination is administered, and upon the completion of the examination a permanent record of the results has been made in convenient form.

HERRING REVISION OF THE BINET-SIMON TESTS

INDIVIDUAL RECORD CARD: FORM A

$\frac{\text{MA}(\quad)}{\text{CA}(\quad)} = (\quad)\text{IQ}$

Grade____ Sex____ Date of birth____ 19____ Examiner____ Date of examination____ 19____ Group____

Room____ Teacher____ Building____ School____ City____

Years attended school____ Quality of school work____ (Ex., Very Good, Good, Fair, Poor) Teacher's estimate of intelligence____ (Very Superior, Sup., Above Avg., Avg., Below Avg., Inferior, V. Inf.)

Height____ inches. Weight____ Parents' nationality____ Father Mother Social status____ (Ex., Good, Fair, Poor, V.P.) Home address____

Remarks____

Test 1. Pictures

Fishing ( ) Applicant ( )
Accident ( ) Spilling ( ) *Max. 4*

Test 2. Number Series

a( ) c( ) e( ) g( )
b( ) d( ) f( ) h( ) *Max. 8*

Test 3. Thought

1( ) 4( ) 7( ) 10( ) 13( )
2( ) 5( ) 8( ) 11( )
3( ) 6( ) 9( ) 12( ) *Max. 13*

Test 4. Digits Backward

2( ) 4( ) 6( ) 8( )
3( ) 5( ) 7( ) 9( ) *Max. 9*

Score of Group A

Test 5. Parts of Body

K( ) F( ) E( ) F( ) *Max. 4*

Test 6. Syllables

I want ( ) We go ( )
In winter ( ) *Max. 3*

Test 7. Comparison

Squares ( ) Circles ( )
Triangles ( ) *Max. 3*

Test 8. Prettier

1( ) 2( ) 3( ) 4( ) *Max. 4*

Test 9. Colors

Black( ) Gray( ) White( ) *Max. 3*

Test 10. Situations

Lost ( ) Store( ) Failed ( )
Lessons( ) Eat ( ) Clothes( ) *Max. 6*

Column Total

Score

Test 11. Thought

1( ) 5( ) 9( ) 13( ) 17( )
2( ) 6( ) 10( ) 14( )
3( ) 7( ) 11( ) 15( )
4( ) 8( ) 12( ) 16( ) *Max. 9*
Number elements correct:( ) ÷ 2 =

Test 12. Definitions

Obed.( ) Pride( ) Host.( ) Prej.( )
Hope ( ) Cult. ( ) Sev. ( ) *Max. 7*

Test 13. Thought

1( ) 4( ) 7( ) 10( )
2( ) 5( ) 8( ) 11( )
3( ) 6( ) 9( ) 12( ) *Max. 6*
Number elements correct:( ) ÷ 2 =

End of Group B

Test 14. Situations

Crying( ) Dripping( ) Accident( )
Wreck ( ) Mud ( ) *Max. 5*

Test 15. Absurdities

House ( ) Thief ( ) One ( )
Dinner( ) Smith( ) Lights ( )
Fare ( ) 25c ( ) *Max. 5*

Test 16. Sentence

1( ) 2( ) 3( ) 4( ) *Max. 4*

Test 17. Rhymes

1( ) 2( ) 3( ) 4( ) *Max. 4*

Test 18. Similarities

Wheel( ) Ink ( ) Cloud( )
Sling ( ) Star( ) Stone ( ) *Max. 6*

Test 19. Proverbs

Paddle( ) Milk ( ) Shout( )
Burnt ( ) Rome ( ) *Max. 5*

Column Total

Score

Test 20. Thought

1( ) 4( ) 7( ) 10( ) 13( )
2( ) 5( ) 8( ) 11( )
3( ) 6( ) 9( ) 12( ) *Max. 7*
Number elements correct:( ) ÷ 2 =

Test 21. Mixed Sentences

1( ) 2( ) 3( ) *Max. 3*

Test 22. Problems

Blocks( ) Miles( ) Miles( ) *Max. 6*
Number elements correct:( ) x 2 =

End of Group C

Test 23. Syllables

We do ( ) It takes( )
In winter( ) Water ( ) *Max. 4*

Test 24. Directions

Cover( ) Left( ) Right( ) *Max. 3*

Test 25. Directions

Diam. & Ov.( ) Diamond ( )
Rectangle ( ) Rect. Ov. & D.( )
Max. 4

Test 26. Similarities

Baseball( ) Rain( )
Wood ( ) Bed ( ) *Max. 4*

Test 27. Generalization *Max. 5*

Test 28. Dirk *Max. 3*

Test 29. Completion

Many are *Max. 5*

Test 30. Problem Reading *Max. 5*

End of Group D

Column Total

Score

Test 31. Objects

Twine ( ) Pin ( ) Nail( )
Hairpin( ) Button( ) *Max. 5*

Test 32. Forms

1( ) 4( ) 7( ) 10( )
2( ) 5( ) 8( )
3( ) 6( ) 9( ) *Max. 5*
Number elements correct:( ) ÷ 2 =

Test 33. Commissions

Penny ( ) Paper( )
Nickel ( ) Order( ) *Max. 4*

Test 34. News Route

1( ) 3( ) 5( )
2( ) 4( ) 6( ) *Max. 6*

Test 35. Digits Forward

2( ) 5( ) 8( )
3( ) 6( ) 9( )
4( ) 7( ) 10( ) *Max. 10*

Test 36. Syllables

Brook( ) After( ) Girls( ) *Max. 3*

Test 37. Roast

1( ) 4( ) 5( ) 11( ) 12( ) *Max. 5*

Test 38. Code *Max. 6*

Number of correct letters:( ) ÷ 2 =

End of Group E

Column Total

Col. 1____ Time ended____
Col. 2____ Time begun____
Col. 3____ Minutes____
Col. 4____
Total Score____ MA____

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DETROIT KINDERGARTEN TEST

Individual

By Harry J. Baker, Clinician, and H. J. Kaufmann, Statistician,
Detroit Public Schools

MANUAL OF DIRECTIONS: REVISED

FEATURES OF THE TEST

The Detroit Kindergarten Test is an individual intelligence examination. It is designed to test the mental ability of the pupil as he enters the kindergarten. It is an individual rather than a group test because (1) the group test method is relatively less feasible for children so immature; (2) the measurement of intelligence of the young child is very important as predictive of classification in school; (3) the examiner has an opportunity to observe the nature of reaction in addition to the score itself.

There is no time limit on this examination. Preliminary trial has shown that most pupils finish in from 7 to 12 minutes. Bright pupils tend to finish in less time than the average or dull pupils.

Twenty-three experienced kindergarten teachers assisted in the preparation of the test in its final form. More than four times as much material was tried out on over 200 pupils than was finally used. The tests range roughly from easy to difficult, and from easy to difficult items within each test. No item appears in the final printing which did not actually differentiate the bright, average, and slow pupils.

DIRECTIONS FOR ADMINISTERING

Fill in the required data on the first page before giving the test.

Mark with ordinary lead pencil whatever objects or object the pupil points to (except as noted later in Test 7). Do not allow the pupil to do the marking.

Unless absolutely unavoidable, have no one present besides examiner and pupil.

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Follow the printed directions under Test Procedure *exactly*. Repeat if necessary.

Proceed with the test in a natural tone of voice and in a leisurely manner. Avoid being hurried by the pupil.

Hold the book so that only one page shows. Best results are obtained when the examiner keeps the lower items on a page covered while those above are being given.

A friendly and coöperative attitude can be established with the child by asking if he would not like to look at some pictures.

TEST PROCEDURE

The boldface type shows the directions that the teacher gives the pupil; remarks to the teacher are in parentheses.

TEST 1

Show me the thing that is up in the sky.

Show me the thing that flies.

Show me the thing that gives light.

TEST 2

(Point to top row each time.) **See these things here. Now show me the one here that is not up there.** (Repeat for each row.)

TEST 3

Two of these things belong together. Show me the one thing which does not belong with them. (Repeat for each row.)

TEST 4

See these two things. Show me one here that is nearest like these two. (Repeat for each row.)

TEST 5

(Examiner points to each group.) **See these things, and these things. Are these all the same or not the same as these?** (Repeat for each row. Write "S" for same, "D" for not the same.)

TEST 6

Two things in this picture are used in the same way. Show me the thing that is not used in that way. (Repeat for each row.)

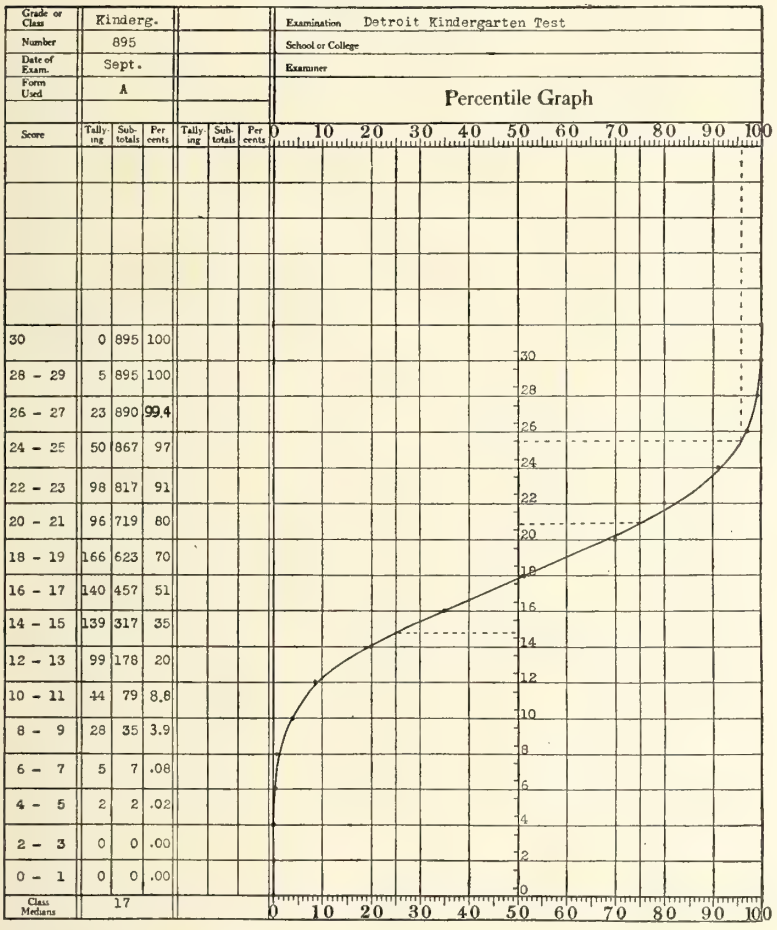
TEST 7

What's wrong with (*a*) **the teakettle?** (*b*) **the boy?** (*c*) **the house?** (*d*) **the shoe?** (*e*) **this picture** (indicating the bed)? (*f*) **the hand?**

In items (*b*) to (*f*), in which the pupil must explain what is wrong, write the response under the item.

in the figure show the actual percentiles plotted from the data. The curve "smooths" the actual data somewhat for the purpose of generalizing it by ironing out irregularities presumably peculiar to this particular group of pupils.

UNIVERSAL PERCENTILE GRAPH



A horizontal line drawn to the curve from a point on the vertical scale representing a score of 25 may be seen to meet it at a point representing a percentile rank of 96 according to the scales at the top and bottom. This means that a pupil making a score of 25 has a percentile rank of 96 among entering kindergarten pupils. In a similar way the percentile rank of a pupil making any other score may be found.

INTERPRETATION AND USE OF RESULTS

There will probably be a wide range of scores among the pupils of your group. In a preliminary testing with this final edition of the test on 895 pupils, scores ranged from 4 to 29 points as shown in Table 1, the median score being 17.

TABLE 1. DISTRIBUTION OF SCORES OF A GROUP OF 895 PUPILS

Score	0 or 1	2 or 3	4 or 5	6 or 7	8 or 9	10 or 11	12 or 13	14 or 15	16 or 17	18 or 19	20 or 21	22 or 23	24 or 25	26 or 27	28 or 29	30	Total
Number making	0	0	2	5	28	44	99	139	140	166	96	98	50	23	5	0	895

If desired, the pupils entering the kindergarten may be divided into classes on the basis of score in such a way that those in each class will be fairly homogeneous in mental ability. The following plan is used in Detroit: Pupils making scores of about 12 points or less are placed in one section and if necessary remain longer than the usual period in the kindergarten. Those making scores of about 23 points or more, if feasible, are advanced to the first grade more quickly than usual. The remaining middle group stay in the kindergarten the usual time. If desired, groups thus formed may be given different kinds of kindergarten instruction appropriate to their degrees of mental ability.

The score in this test or any other test should never be followed blindly. It should be used tentatively to indicate the group to which the pupil appears to belong. It is merely a starting point for further personal observation upon the part of the teacher, and any pupil should be given a trial in a different section if he shows evidence of belonging there.

The Percentile Graph. All the data given in Table 1 are represented by the percentile curve in the accompanying figure, which is called a Percentile Graph. The scale on the vertical line is a scale of scores. The scales at the top and bottom indicate percentile ranks. The percentile curve cuts the 50-percentile line at a point slightly above that of a score of 17. This means that 50 per cent of these entering kindergarten pupils made scores of about 17 or better. The curve cuts the 75-percentile line at a point about opposite that representing a score of 20, showing that 75 per cent of the pupils exceeded a score of 20. The dots

Test 8

See these pictures. Point to two things which show that it is summer.
See these pictures. Point to two things which show that it is summer.
See these pictures. Point to two things which show that it is winter.

INSTRUCTIONS FOR SCORING

It is suggested that one unused blank be marked correctly to be used as a scoring key. Always refer to such a key or the instructions given above; otherwise scoring becomes inaccurate. Put the score for each test at the bottom of the test. Transcribe these scores to the appropriate spaces on the first page of the test and find the total score.

The maximum score on the test is 30 points. One point credit is allowed for each row, except in Test 7, where one point is given for each item. No credit is allowed unless the correct item or items *only* are marked.

Test	Item or Items Correct	Points
1	Moon, bird, lamp	3
2	Chick, turkey, swan, goose	4
3	Second, third, first, second	4
4	Wagon, sunbonnet, saw	3
5	Different, same, different	3
6	Slipper, piano stool, sled, knife	4
7	(*a*) Either spout. (*b*) Clock or watch face. (*c*) Chimney at side. (*d*) Too many buttons or two rows of buttons. (*e*) Child at wrong end or bed turned wrong way. (*f*) Hand has too many fingers	6
8	Boy swimming, boy fishing; boy raking, boy throwing ball; boy walking, boy skating	3
	Total	30

INSTRUCTIONS FOR TABULATION

In order that your records may be complete and permanent for each pupil, enter their records on the Record Sheet. Arrange the test papers in alphabetical order, or better, in order of excellence, placing the best record first. Write in the appropriate columns the pupil's name, his age in years and months, and the total score. The scores in the various tests may be entered also if desired.

It will be helpful in interpreting the scores of one's own class to draw a percentile curve representing them, similar to that shown in the figure. This may be done on the Universal Percentile Graph (published by World Book Company), of which the figure is a reproduction. Complete directions for drawing and interpreting percentile curves accompany the graphs.

The percentile curve drawn for one's own class will show at a glance the median score of the class, the percentile rank of any pupil among its members, etc., as well as the comparison between the class as a whole and the group whose scores are given above. Curves representing the scores of two or more classes may be drawn on the same graph and conveniently compared.

Norms. In Table 2 are given the scores which are the norms for ages 3 years 0 months to 7 years 6 months. These norms are based partly upon total scores of 5068 pupils and partly upon Binet mental ages of 102 pupils. Because of the fact that the comparatively younger pupils in a kindergarten tend to be brighter than normal and the older pupils to be duller, it is very difficult to obtain norms; and such norms as may be compiled are necessarily somewhat hypothetical except for the age of about five years, where they are fairly reliable. The authors recommend against using this table for converting scores into mental ages, but if so used in order to find IQ's, it is suggested that the lesser age for which a given score is the norm be taken as the corresponding mental age.

TABLE 2. AGE NORMS FOR DETROIT KINDERGARTEN TEST

MONTHS	YEARS				
	3	4	5	6	7
0	2	8	15	22	28
1	2	8	16	22	28
2	2	9	16	23	29
3	3	10	17	23	29
4	3	10	17	24	29
5	4	11	18	24	30
6	5	11	18	25	30
7	5	12	19	25	
8	6	13	19	26	
9	6	13	20	26	
10	7	14	20	27	
11	7	14	21	27	

NATIONAL INTELLIGENCE TESTS

CLASS RECORD

School or institution ..... City ..... State .....

Grade ..... Teacher ..... Examiner ..... Date ..... Grade standard .....

Lowest score ..... First quartile ..... Median ..... Average ..... Third quartile ..... Highest score .....

	NAME	AGE		SCALE A Form		SCALE B Form		Scales A and B Combined		SCHOOL DATA	REMARKS AND RECOMMENDATIONS
		Yrs.	Mos.	Total Score	Percentile Rank	Total Score	Percentile Rank	Total Score	Percentile Rank		
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											

(Class Record continued on next page.)

This Class Record is for the use of the examiner. It is requested that a carbon copy be made on the attached Report to Author and the latter mailed to the Committee on National Intelligence Tests, care of World Book Company, Yonkers-on-Hudson, New York.

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CLASS RECORD — *Continued*

	NAME	AGE		SCALE A Form		SCALE B Form		Scales A and B Combined		SCHOOL DATA	REMARKS AND RECOMMENDATIONS
		Yrs.	Mos.	Total Score	Percentile Rank	Total Score	Percentile Rank	Total Score	Percentile Rank		
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											
41											
42											
43											
44											
45											
46											
47											
48											
49											
50											

20 or over

GOODENOUGH INTELLIGENCE TEST

For Kindergartens and Primary Grades

By FLORENCE L. GOODENOUGH, PH.D.
Research Assistant Professor, Institute of Child Welfare
University of Minnesota

CHILDREN'S DRAWING SHEET

Name ..... Sex .....

Age .....years, ...months. Grade .....Date .....

School ..... City .....

SCORE	
M.A.	
IQ	

SUPPLEMENTARY DATA

Date of child's birth ..... Birthplace .....

Nationality of father ..... Nationality of mother .....

Language spoken at home ..... Social status .....

Teacher's estimate of intelligence: very superior, superior, average, inferior, very inferior. (*Underline.*)

Quality of school work: very superior, superior, average, inferior, very inferior. (*Underline.*)

Health: excellent, good, fair, poor. (*Underline.*)

Attendance: very regular, fairly regular, somewhat irregular, very irregular. (*Underline.*)

Additional notes: .....

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GIT–3

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CLASS A

Total score . . . . . .

CLASS B

Total score . . . . . .

1	11 *a* . . .
2	11 *b* . . .
3	
4 *a* . . .	12 *a* . . .
4 *b* . . .	12 *b* . . .
4 *c* . . .	12 *c* . . .
5 *a* . . .	12 *d* . . .
5 *b* . . .	12 *e* . . .
6 *a* . . .	13 . . . .
6 *b* . . .	14 *a* . . .
7 *a* . . .	14 *b* . . .
7 *b* . . .	14 *c* . . .
7 *c* . . .	14 *d* . . .
7 *d* . . .	14 *e* . . .
7 *e* . . .	14 *f* . . .
8 *a* . . .	15 *a* . . .
8 *b* . . .	15 *b* . . .
9 *a* . . .	16 *a* . . .
9 *b* . . .	16 *b* . . .
9 *c* . . .	16 *c* . . .
9 *d* . . .	16 *d* . . .
9 *e* . . .	
10 *a* . . .	17 *a* . . .
10 *b* . . .	17 *b* . . .
10 *c* . . .	
10 *d* . . .	18 *a* . . .
10 *e* . . .	18 *b* . . .

KEY FORM 1

Second Sheet

SCALE A

TEST	1	2	3	4	5	TOTAL
MAXIMUM SCORE	32	40	48	40	36	196

Test 5

(5) (10) (15) (20)

3 2 1 3 1 2 3 4 1 5 6 2 1 4 7 9 5 2 3 8

(25) (30) (35) (40)

4 9 2 8 6 1 7 5 3 4 8 6 3 1 2 5 9 7 4 2

(45) (50) (55) (60)

6 3 8 5 9 7 1 4 5 9 6 2 8 3 7 1 6 2 1 7

(65) (70) (75) (80)

9 8 5 3 4 8 2 5 7 3 9 6 4 1 3 8 2 6 9 5

(85) (90) (95) (100)

4 7 1 9 7 5 3 2 4 6 8 1 6 4 8 9 7 5 4 6

(105) (110) (115) (120)

8 2 3 1 5 7 9 4 6 8 5 7 9 8 6 4 6 8 7 9